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STATEWIDE INVENTORY
OF
AIR POLLUTANT EMISSIONS
STATE OF KANSAS
1970

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16. Abstracts
The results of the emissions inventory for the State of Kansas are presented. The purposes of the study were: 1. to calculate the emissions of air pollutants from point and area sources in the State of Kansas. 2. to assemble the emission data in a suitable format for use in developing the Implementation Plan, The emissions inventory included the following pollutants: particulates, sulfur oxides, nitrogen oxides, carbon monoxide, and hydrocarbons.

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1.0 TASK DESCRIPTION

This report presents the results of the emissions inventory for the State of Kansas. The purposes of the study were:

1. To calculate the emissions of air pollutants from point and area sources in the State of Kansas.
2. To assemble the emission data in a suitable format for use in developing the Implementation Plan.

The five pollutants included in the emissions inventory are:

- Particulates
- Sulfur Oxides
- Nitrogen Oxides
- Carbon Monoxide
- Hydrocarbons

Point source emission estimates, with the exception of those for Wyandotte County, were prepared by the Air Quality and Occupational Health Section of the Environmental Health Division, Kansas State Department of Health. Emissions from point sources in Wyandotte County were calculated by the Kansas City, Kansas, Wyandotte County Department of Health, Division of Air Pollution Control. PEDCo-Environmental Specialists, Inc. calculated the area source emissions and assembled the area and point source emission data in the required implementation plan format.

2.0 AREA DESCRIPTION

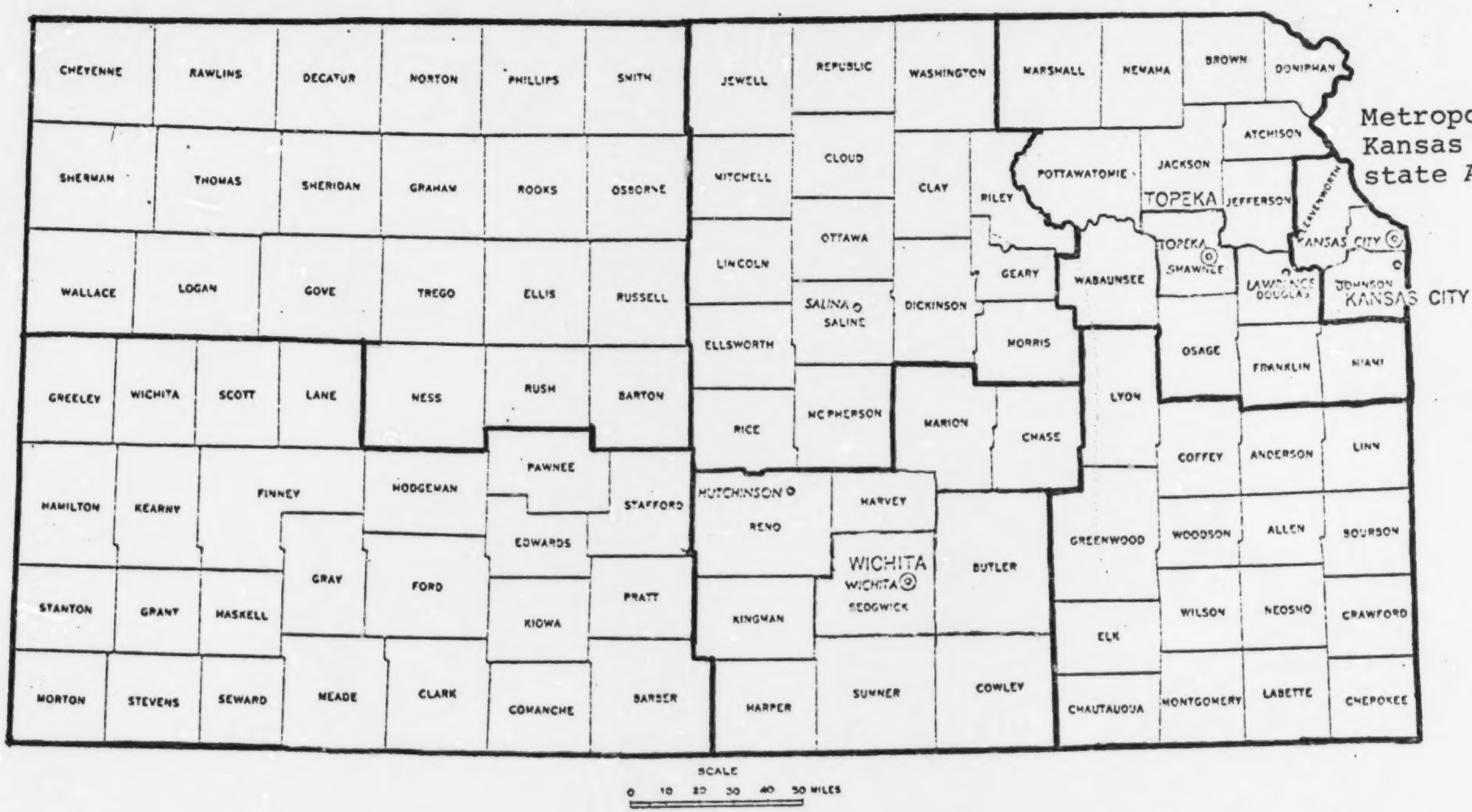
The seven Kansas Air Quality Control Regions and the counties in each Region are shown in Figure 1.1. The AQCR region codes are in parentheses.

Maps of the grid systems for Sedgwick and Shawnee Counties and the Kansas portion of the Kansas City Interstate AQCR are contained in Section 4.0.

Northwest Kansas Intrastate Air Quality Control Region (097)

North Central Kansas Intrastate Air Quality Control Region (096)

Northeast Kansas Intra state Air Quality Control Region (095)



Metropolitan Kansas City Interstate Air Quality (094)

Southwest Kansas Intrastate Air Quality Control Region (100)

South Central Kansas Intrastate Air Quality Control Region (099)

Southeast Kansas Intrastate Air Quality Control Region (098)

Figure 1.1 State of Kansas Air Quality Control Regions

3.0 METHODOLOGY

3.1 Point Sources

For purposes of this study, a point source was defined as any source which emits ten tons per year or more of any single pollutant. In addition, most, if not all, of the processes defined in Appendix C of the Federal Register, April 9, 1971, were included as point sources irrespective of the quantity of pollutants emitted.

The point sources were identified in a previous survey conducted by the Kansas State Agency. As part of that survey, approximately 4,000 questionnaires were mailed to potential sources. About 1,500 questionnaires were returned. Follow-up contacts by area representatives of the State Agency insured that all potential point sources were considered. Additional contacts were made by the State Agency as part of this emissions inventory to update the emission estimates and obtain point source fuel usage data.

Emissions were calculated by applying emission factors to the fuel quantities, refuse quantities, and production rates obtained by questionnaires and plant visits. The extent of control on each point source was also determined by questionnaire or plant visit.

The State Agency tabulated emissions from each point source by county, with the exceptions of those sources in Sedgwick, Shawnee, Leavenworth, Johnson, and Wyandotte. Emissions from point sources in these latter counties are listed in the computer print out. The computer print out also lists the county point source emission totals.

A summary tabulation of the point and area source emissions in each AQCR is presented in Section 5.0 of this report.

3.2 Area Sources - Fuel Combustion

Fuel usage data determined in a previous Office of Air Program's survey and by the Wyandotte County Department of Health were used for the Kansas portion of the Kansas City Interstate AQCR. These fuel totals were subtracted from State totals to yield the fuel quantities to be apportioned to the other six AQCR's.

The fuel consumption categories used in the emissions inventory were residential, commercial-institutional, and industrial. This section outlines the procedures used for determining the quantity of fuel in each category and the method of apportioning this quantity to the individual counties.

Where specific data were not available, the following values were used for the fuel parameters:

Bituminous Coal

% Ash 11.3
% Sulfur 4.4

Distillate Oil

% Sulfur .27

Residual Oil

% Sulfur 1.2

Natural Gas

% Sulfur .0001

3.2.1 Residential Fuel

A. Coal

Data: ° 1960 Census of Housing - Kansas;

° Statistical Abstracts of the U.S., 1969;

° U.S. Bureau of Mines, Distribution of Pennsylvania Anthracite for Coal Year April 1, 1967, to March 31, 1968.

° Air Pollutant Emission Inventory Techniques, Unpublished Report, E.P.A., OAP, Bierbaum, P.G. and Gedgaudas, M.J.

Procedure: Since the fuel use data in the 1970 Census of Housing were not available, the 1960 census data were used. Residential coal usage for each county, with the exception of those counties in the Kansas portion of the

Kansas City AQCR, was calculated using the number of degree-days in Wichita -- assumed representative of the State, the total number of dwelling units using coal for space heating in each county, and the appropriate factor from the Emission Inventory Techniques document. To account for the reduction in the number of units which use coal for space heating and to place residential coal usage in reasonable proportion to the commercial-institutional and industrial usage, the calculated amount was reduced by 35%. Residential coal was apportioned to individual counties by using the ratio of number of dwelling units which use coal for space heating in a county to the six Region total for such dwelling units. It was assumed that the coal is all bituminous since only 1,296 tons of anthracite are reported to have been shipped to Kansas.

For the Kansas City AQCR, the estimates of residential coal usage made by the OAP were used.

B. Fuel Oil

Data: ° 1960 Census of Housing - Kansas;

° Statistical Abstracts of the U.S., 1969.

Procedure: The number of dwelling units in the six AQCR's which use fuel oil for "cooking fuel" and "water heating fuel" was multiplied by 250 gallons per year-dwelling

unit. The number of dwelling units using fuel oil for space heating in the six AQCR's was multiplied by the number of degree-days in Wichita and the appropriate factor from the Emission Inventory Techniques document. The six AQCR residential fuel oil total (i.e., cooking, water heating and space heating fuel) was apportioned to the individual counties using the ratio of the number of dwelling units which use fuel oil for space heating in a county to the six Region total of such dwelling units.

In the Kansas City AQCR, the OAP estimates of fuel oil consumption were used.

C. Natural Gas

Data: ° U.S. Bureau of Mines: 1969 Minerals Yearbook, Natural Gas Preprint;

° Department of Commerce, 1960 Census of Housing - Kansas.

Procedure: The quantity of natural gas delivered to Kansas consumers for residential use was obtained from the Minerals Yearbook. The amount of natural gas consumed for residential use in the Kansas portion of the Kansas City Interstate AQCR, determined in the OAP survey, was subtracted from this value. The difference was apportioned to each county outside the Kansas City AQCR using, as the apportioning

factor, the ratio of the number of dwelling units which use natural gas for space heating in each county to the total number of such units in the six other Regions.

3.2.2 Commercial-Institutional Fuel

A. Coal

Data: ° U.S. Bureau of Mines, Mr. L. Westerstrom, (703) 557-1350;

° U.S. Bureau of the Census, Census of Manufacturers: 1963. Fuels and Electric Energy Consumed in Manufacturing Industries: 1962.

° U.S. Department of Commerce, 1967 Census of Business-Wholesale Trade, Kansas;

° U.S. Department of Commerce, 1967 Census of Business-Retail Trade, Kansas;

° Kansas State Board of Agriculture, Population of Kansas by Counties - 1970.

Procedure: From the Bureau of Mines, it was determined that 374,000 tons of coal were shipped to Kansas and Nebraska during 1970 for "retail" and "all other" use. These categories include coal used for industrial, commercial-institutional and residential purposes, but do not include coal used by power plants. Based on the industrial coal distribution data in the Census of Manufacturers' report, it was assumed that 54% of the 374,000 tons was shipped to Kansas. The amount of commercial-institutional and industrial area source coal

was determined by subtracting the following from this amount: the point source industrial coal identified in the point source survey, the residential coal as calculated above, and the coal used in the Kansas portion of the Kansas City Interstate AQCR. This difference was divided equally between commercial-institutional and industrial area source coal. The commercial-institutional coal was apportioned to individual counties using a factor computed as follows:

$$\text{County Apportioning Factor} = [1/3(\frac{A}{B}) + 1/3(\frac{C}{D}) + 1/3(\frac{E}{F})]$$

where:

A = number of retail establishments in a county

B = number of retail establishments in the six Regions

C = number of wholesale establishments in a county

D = number of wholesale establishments in the six Regions

E = county population

F = six Region population.

B. Distillate Oil

Data:
- U.S. Bureau of Mines, Sales of Fuel Oil and Kerosene in 1969;
- U.S. Department of Commerce, 1967 Census of Business-Wholesale Trade, Kansas;
- U.S. Department of Commerce, 1967 Census of Business-Retail Trade, Kansas;
- Kansas State Board of Agriculture, Population of Kansas by Counties - 1970.

Procedure: The quantities of "kerosene" and"distillate-type heating oils" sold in Kansas were obtained from the U.S. Bureau of Mines report. Distillate fuel oil used domestically in the Kansas portion of the Kansas City AQCR, and the amount used by commercial-institutional point sources throughout Kansas were subtracted from the total to yield the quantity of area source commercial-institutional fuel. This difference was apportioned to individual counties using the factors developed for commercial-institutional coal apportionment.

C. Residual Oil

Data:
- U.S. Bureau of Mines, Sales of Fuel Oil and Kerosene in 1969;
- U.S. Department of Commerce, 1967 Census of Business-Wholesale Trade, Kansas;
- U.S. Department of Commerce, 1967 Census of Business-Retail Trade, Kansas;
- Kansas State Board of Agriculture, Population of Kansas by Counties - 1970.

Procedure: The quantity of oil listed in the Bureau of Mines report as "Residual-type Heating Oils" and "Residual-type Fuel Oil for use by the Military" were considered to be used solely for commercial-institutional fuel combustion. The amount of commercial-institutional residual oil identified

in the point source survey, and that used in the Kansas City AQCR for commercial-institutional purposes, was subtracted from this total. The difference was apportioned to each county using the factors developed for commercial-institutional coal apportionment.

In the Kansas City AQCR, the quantity of fuel identified in the OAP survey was used to estimate emissions.

D. Natural Gas

Data: ° U.S. Bureau of Mines: 1969 Minerals Yearbook, Natural Gas;

° U.S. Department of Commerce, 1967 Census of Business-Wholesale Trade, Kansas;

° U.S. Department of Commerce, 1967 Census of Business-Retail Trade, Kansas;

° Kansas State Board of Agriculture, Population of Kansas by Counties - 1970;

° Annual Reports by Natural Gas Companies; Kansas State Corporation Commission, Topeka, Kansas.

Procedure: Natural gas sales data by county and user category, namely residential, commercial, and industrial, were obtained from the Kansas State Corporation Commission for the following companies:

- Arkansas - Louisiana Gas Company
- Central Kansas Power Company
- The Gas Service Company
- Greeley Gas Company
- Kansas-Nebraska Natural Gas Company
- Northern Natural Gas Company
- The Tri City Gas Company
- Union Gas System Inc.

The residential and commercial gas sales by these companies accounted for approximately 85% of the residential and commercial sales reported in the Bureau of Mines Yearbook. However, the Kansas Corporation Commission data did not include some of the smaller companies and did not distinguish between residential and commercial natural gas sales for all companies. The Bureau of Mines' numbers were considered to be more complete and thus were used. Further, since some of the counties were not included in the Kansas Corporation Commission listing, the commercial and institutional natural gas was apportioned using the same factors as developed for coal. The quantity of natural gas apportioned was the difference between (1) the sum of the "commercial" and "other consumer" figures in the Bureau of Mines Yearbook, and (2) the amount of natural gas consumed by commercial/institutional establishments in the Kansas portion of the Kansas City AQCR plus the amount identified in the point source survey as consumed by commercial and institutional point sources throughout the state.

In the Kansas City AQCR, the quantity of natural gas identified in the earlier OAP survey was used to estimate emissions.

3.2.3 Industrial Fuel

A. Coal

Data:
- U.S. Bureau of Mines, Mr. L. Westerstrom, (703) 557-1350;
- U.S. Bureau of the Census, Census of Manufacturers: 1963. Fuels and Electric Energy Consumed in Manufacturing Industries: 1962.
- U.S. Department of Commerce, 1967 Census of Manufacturers, Kansas.

Procedure: The method of determining the quantity of area source coal was described in Section 3.2.2A. Area source coal was apportioned to the individual counties using the ratio of the number of manufacturing employees in a county to the six Region total of such employees as the apportioning factor. In the Kansas City AQCR, the coal usage estimates prepared by the earlier OAP survey were used.

B. Distillate Oil

Data:
- U.S. Bureau of Mines, Sales of Fuel Oil and Kerosene in 1969;
- U.S. Department of Commerce, 1967 Census of Manufacturers, Kansas.

Procedure: The quantities of distillate oil listed in the Bureau of Mines report as "industrial use", "oil company use" and "miscellaneous uses" were categorized as industrial fuel oil. The quantities of distillate identified in the point source survey and in the Kansas portion of the Kansas City AQCR were subtracted from this total. The difference was apportioned to the individual counties using the factors developed for industrial coal apportionment.

C. Residual Oil

Data:
- U.S. Bureau of Mines, Sales of Fuel Oil and Kerosene in 1969;
- U.S. Department of Commerce, 1967 Census of Manufacturers, Kansas.

Procedure: The quantity of residual oil for industrial use was obtained from the Bureau of Mines report under the same usage type classifications listed for distillate oil. The quantities of industrial residual oil identified in the point source survey and in the Kansas City AQCR were subtracted from this total. The difference was apportioned using the same factors developed for industrial coal apportionment.

D. Natural Gas

Data:
- U.S. Bureau of Mines: 1969 Minerals Yearbook, Natural Gas;
- U.S. Department of Commerce, 1967 Census of Manufacturers, Kansas.

Procedure: From the Bureau of Mines Yearbook, natural gas usage figures were obtained for the following industrial categories:

- "industrial use"
- "lease and plant fuel"
- "pipeline fuel".

In addition, the difference between the Bureau of Mines total for power plant fuel use and the quantity identified in the point source survey as used by power plants, was added to the above three natural gas figures. This was done simply to account for this quantity of gas.

From this total, the industrial point source natural gas and the natural gas used in the Kansas portion of the Kansas City AQCR were subtracted to determine the six Region total of area source industrial gas. This quantity was apportioned using the factors developed for industrial distillate oil apportionment. In the Kansas City AQCR, the industrial gas usage figures identified in the previous OAP survey were used.

3.3 Area Sources - General

3.3.1 Solid Waste Disposal

Data:
- 1968 National Survey of Community Solid Waste Management Practices, EPA. Cincinnati, Ohio;
- Acreage of Rangeland Intentionally Burned, Cooperative Extension Service, R.M. Hyde, Kansas State University.

Procedure: The quantity of refuse generated in each county was calculated using different solid waste generation factors for rural and urban counties. All but Johnson, Sedgwick, Shawnee and Wyandotte counties were considered rural. The rural solid waste generation factor used was 5.5 pounds per capita day or one ton of refuse per capita per year. For the four urban counties a factor of two tons per capita per year was used.

From the National Survey data, the quantity of waste which was collected was determined as well as its method of disposal. Only those land disposal sites identified in the survey as practicing no open burning were considered sanitary landfills; both "uncontrolled" and "planned and limited" burning were treated as 100% open burning dumps.

The percent collected ranged from about 30 to 70 percent. It was assumed that 100% of the uncollected rural solid waste was open burned. The uncollected urban waste was assumed to be domestic, commercial and industrial waste handled on-site or at a private site. The ratio of manufacturing employees to population was used to approtion the uncollected amount of the urban refuse into two categories: waste which was burned in domestic incinerators and waste which was burned in commercial-industrial incinerators.

Several counties also practice range-burning of agricultural wastes. The acreage burned in these counties was estimated by the Kansas State University Extension Service. Emissions were calculated using the agricultural open burning emission factors and assuming that an average of 700 pounds of material were burned per acre. Table 3.1 lists by region and county the acreage burned and the resulting emissions.

All emissions from solid waste disposal operations were listed as area sources with the exceptions of the open burning dumps in the Kansas portion of the Kansas City Interstate AQCR. However, many of the dumps in this AQCR have ceased burning in either 1970 or 1971. The conical burners in Dodge City (Ford County) and Garden City (Finney County) were listed in the Section V tabulation as "On Site - Area Sources". Other emissions included in this category are those resulting from domestic, commercial, and industrial incinerators located in the four urban counties.

The emissions listed in the category "Open Burning, On Site Area Sources" include those from open burning dumps where the burning may be either "planned and limited" or "unlimited" plus open burning of uncollected refuse. Emissions

A

TABLE 3.1 KANSAS ARGICULTURAL BURNING BY CO

AQCR REGION	COUNTY	ACREAGE[1] BURNED	TONNAGE BURNED	PART.
095	Marshall	10,000	3,500	30
	Osage	5,000	1,750	15
	Pottawatomie	30,000	10,500	90
	Wabaunsee	50,000	17,500	150
096	Geary	20,000	7,000	60
	Morris	40,000	14,000	120
	Riley	25,000	8,750	75
098	Chautauqua	10,000	3,500	30
	Coffey	5,000	1,750	15
	Elk	20,000	7,000	60
	Greenwood	70,000	24,500	210
	Lyon	40,000	14,000	120
	Wilson	5,000	1,750	15
	Woodson	5,000	1,750	15
099	Butler	20,000	700	60
	Chase	60,000	21,000	180
	Cowley	5,000	1,750	15

(1) Data provided by the Kansas State University Extension Service.

KANSAS ARGICULTURAL BURNING BY COUNTY

TONNAGE BURNED	EMISSIONS (TONS/YEAR) PART.	SO_2	CO	HC	NO_x
3,500	30	-	175	35	3.5
1,750	15	-	88	18	1.8
10,500	90	-	525	105	10.5
17,500	150	-	880	180	18
7,000	60	-	350	70	7
14,000	120	-	700	140	14
8,750	75	-	440	90	9
3,500	30	-	175	35	3.5
1,750	15	-	88	18	1.8
7,000	60	-	350	70	7
24,500	210	-	1225	245	24.5
14,000	120	-	700	140	14
1,750	15	-	88	18	1.8
1,750	15	-	88	18	1.8
700	60	-	350	70	7
21,000	180	-	1050	210	21
1,750	15	-	88	18	1.8

sity Extension Service.

from rangeland burning are listed in the separate category of "Agricultural Burning".

3.3.2 Motor Vehicles

Data: ° Number of Miles and Annual Average Daily Vehicle Miles of Travel on State Highways (including city connecting links), Local Federal-aid Secondary Highways, Local City Streets, and Local Rural Roads in Kansas by County for the Year Ending December 31, 1969. State Highway Commission of Kansas, Topeka, Kansas;

° Topeka and Wichita Functional Classification Maps: Traffic Count Data, State Highway Commission of Kansas.

Procedure: The total number of vehicular miles driven in each county was obtained from the Kansas Highway Commission. The data are listed by the following categories: State Highways, Local City Streets, Secondary Highways (rural and urban), and Local Rural Roads. The State highways category includes the Kansas Turnpike and city connecting links. It was assumed that all vehicle miles, except those for state highways, were driven at an average of 25 miles per hour. State highway travel was assumed to be at an average of 45 miles per hour. Emission factors based upon vehicle-miles driven at 25 MPH and 45 MPH were used to calculate the emissions in each county.

For Shawnee and Sedgwick Counties, traffic maps were used to estimate vehicular emissions in each grid using the traffic count method.

The motor vehicle emission estimates made in the previous OAP survey were used for the Kansas portion of the Kansas City Interstate AQCR.

3.3.3 Motor Vehicles - Diesel

Data: ° Revenue from Sale of Diesel Fuel in Kansas, Department of Revenue, Motor Fuel Tax Division, Walter Dunn, Chief (913) 296-2411;

° Total Registration for 1968 by County, Kansas Motor Vehicle Department.

Procedure: The Department of Revenue collected $8,258,379 from a $0.08 per gallon tax on diesel fuel. The corresponding 103,230,000 gallons were apportioned to individual counties using the ratio of the number of trucks registered in a county to the state total of registered trucks.

3.3.4 Aircraft

Data: ° 1971 Airport Directory, Aircraft Owners and Pilots Association, Washington, D.C. 20014.

Procedure: All airports in Kansas which had a control tower or at least a 3,500 foot paved runway were sent a questionnaire requesting 1970 data on the number of flight operations by type of aircraft. All but two of the twenty-two questionnaires were returned. In the several cases where there was insufficient information regarding the type of aircraft, the following assumptions were made:

Type of Operation	Type of Aircraft
Air Carrier	95% is jet powered. Three engine.
Military - Itinerant	80% jet, 20% piston. 65% two engine, 35% single engine.
Civil - Itinerant	80% piston, 20% jet. 65% single engine, 35% multi-engine.
Civil - Local	90% piston, 10% jet. 70% single engine, 30% multi-engine.
Military - Local	90% jet, 10% piston. 90% multi-engine, 10% single engine.

Emissions from operations at the Fairfax Airport, Wyandotte County, were estimated by the Wyandotte County Department of Health.

3.3.5 Vessels

Data: °Waterborne Commerce of the United States; Department of the Army Corps of Engineers, Part 2 (p. 13, 1969).

Procedure: A total of 2,807,000 tons of freight movement is listed for the section of the Missouri River between Kansas City, Kansas and Omaha, Nebraska. Using a factor of 1/100 of a gallon of diesel fuel per ton-mile of barge movement, it was determined that 28,000 gallons of diesel fuel were consumed per mile of river. The resulting emissions

were halved since it was assumed that half of the emissions would be in Missouri. Emissions were apportioned to each county, and grid where appropriate, on the basis of the length of continuous river front.

3.3.6 Railroad

Data: ° U.S. Bureau of Mines, Sales of Fuel Oil and Kerosene, 1969;

° U.S. Department of Commerce, City and County Data Book, 1962.

Procedure: The total quantity of fuel oil used by railroads in Kansas was obtained from the Bureau of Mines Report. The quantity of fuel used by railroads in the Kansas portion of the Kansas City AQCR was subtracted from this total; this quantity was determined by multiplying the amount of railroad fuel used in the entire Interstate AQCR - identified in the previous OAP survey - by the ratio of track miles in the Kansas portion of the AQCR to the total track miles in the AQCR.

The quantity of fuel oil used in the six Regions was apportioned to the counties in proportion to the ratio of the number of transportation employees in a county to the six Region total of such employees. The reasonableness of this apportionment was confirmed by inspection of the railroad map which indicated track mileage per county.

In Topeka and Wichita, railroad fuel usage was apportioned to the grids by assuming that 80% of the fuel was used equally in those grids with switching yards and the remaining 20% was used equally in those grids having railroad tracks.

Railroad emissions estimates developed in the previous OAP survey of the Kansas City AQCR were used for that region.

3.3.7 Gasoline Handling and Evaporation

A. Fuel Storage Evaporation Losses

Data: ° Petroleum Facts and Figures, 1967 Edition, page 160.

° Compilation of Air Pollution Emission Factors, Preliminary document, April 1971.

Procedure: Kansas has a total fuel storage capacity of 125,434,000 and 27,492,000 gallons of gasoline and kerosene respectively. To calculate evaporation emissions, the total kerosene capacity was multiplied by 135/238 to compensate for its lower volatility. The corrected kerosene plus gasoline storage capacity of 140,829,000 gallons was used to calculate emissions.

Breathing losses from fixed roof storage tanks were calculated using appropriate emission factors and assuming

that 75% of the total fuel storage capacity is of the fixed roof variety.

Working losses from fixed roof storage tanks were calculated by assuming that throughput is equal to 6 times the capacity as suggested in the Emission Factors document.

Breathing losses for floating roof tanks were calculated assuming that an "average" tank has a 50 ft. diameter and a 35,000 gallon capacity.

The total fuel storage evaporation losses for the state are the sum of the above categories. These emissions were apportioned using the ratio of gasoline sales in a specific county to the state total.

B. Gasoline Marketing

Data: ° Annual Average Daily Vehicle Miles of Travel in Kansas by County Excluding Travel on Interstate Highways for the Year Ending December 31, 1969, and Percent of State Total, State Highway Commission of Kansas, Topeka, Kansas;

° Revenue from Sale of Gasoline in Kansas, Department of Revenue, Motor Fuel Tax Division, William Dunn, Chief (913) 296-2411.

Procedure: In 1970, Kansas received $82,298,000 from a $0.07 per gallon gasoline tax. This includes $8,440,000

eventually refunded because of off-road use. The total amount of gasoline sold, 1,176 billion gallons, was apportioned to the counties using the percent of total state vehicle miles driven in each county as the apportioning factor. Evaporation losses from gasoline marketing were calculated using an emission factor of 21 pounds of hydrocarbons per thousand gallons of gasoline.

3.3.8 Solvent

A. Dry Cleaning

Data: ° 1970 Kansas Population by County, Kansas State Board of Agriculture.

Procedure: Dry cleaning solvent evaporation losses were determined by multiplying the total state population by the emission factor of 2.7 pounds per capita per year. Solvent losses for the state were apportioned to each county on the basis of population.

B. Paint Solvents

Data: ° Chemicals, Petroleum, and Rubber and Plastics Products Manufacturing; U.S. Department of Commerce (April 1969).

Procedure: In 1966, the national value of shipments of paints and allied products totalled $2,710 million. The value of such shipments in Kansas was assumed to be equal to

the state-to-nation ratio of capital expenditures for chemicals and allied products, namely 14.2/2515.8. Dollar apportionment to the counties was on the basis of manufacturing employees:

$$\frac{(14.2)}{(2515.8)} \times \frac{(2,710)}{(1)} \times \frac{\text{\# of manufacturing employees (county)}}{\text{\# of manufacturing employees (state)}}$$

= $ millions of dollars (county).

It was further determined that $1 million in paint sales is equivalent to 450 tons of solvent per year. This estimate was based upon:

- A price range of $4 to $7 per gallon.
- 10% to 60% solvent content.
- The fraction of the total sales for the particular type of paint or allied product considered.

Paint solvent emissions were calculated using the following formula:

$$\frac{(450)}{(1 \times 10^6)} \times \$ \text{ Millions Dollars (county)} = \text{Tons/Yr. Paint Solvent Emissions.}$$

C. Ink Solvent Emissions

Data: ° Chemicals, Petroleum, and Rubber and Plastics Products Manufacturing; U.S. Department of Commerce, (April 1969).

Procedure: Total ink sales in the U.S. amounted to $367 million. Ink usage was apportioned to the counties according to the following formula:

$$\frac{(14.2)}{(2515.8)} \times (367) \times \frac{\text{\# of manufacturing employees (county)}}{\text{\# of manufacturing employees (state)}}$$

$$= \text{\$ million ink (county).}$$

Ink solvent emission estimates were based on the assumptions that ink costs $0.30 per pound and has a 60% volatile content. The following formula was used:

$$\text{Ink Solvent Emissions (Tons/Yr.)} = \frac{(\text{\$ Million Ink Sales, County})\ (.6)}{(\$0.30/\text{lb.})\quad (2{,}000\ \text{lb/ton})}$$

4.0 AREA GRIDDING

Grid systems were prepared for Sedgwick and Shawnee Counties using the Universal Transverse Mercator System. The established grid system for Leavenworth, Johnson, and Wyandotte Counties in the Kansas portion of the Kansas City Interstate AQCR was used.

All grid systems used 2.5, 5.0 and 10.0 square kilometer grids. The grid systems extended to the county lines.

4.1 Sedgwick County (Wichita)

The grid apportioning factors for Sedgwick County were based on the 1970 preliminary population estimates by census tract and on the data contained in the "1990 Land Use Projections and Preliminary Development Plan". This information was obtained from the Wichita-Sedgwick County Metropolitan Area Planning Department, Wichita, Kansas.

Residential fuel usage was apportioned to grids using the ratio of the population in that grid to the county population.

Commercial-institutional fuel usage was apportioned using the 1990 land use projection of comercial acreage,

since the 1960 actual land use data were incomplete. The apportioning factor for each grid was the ratio of commercial acreage in that grid to the total commercial acreage in the county.

Industrial fuel was apportioned to each grid using the ratio of the 1990 projection of industrial acreage in that grid to the projected county total of industrial acreage.

Solvent evaporation emissions were apportioned to each grid using the ratio of the sum of the commercial-institutional and industrial acreage in a grid to county total of such acreage.

Motor vehicular emissions in a grid were determined by the traffic count method for the 47 grids where traffic data were available. This procedure accounted for approximately 85% of the vehicle miles listed as driven in the county by the Kansas State Highway Commission. The remaining 15% was apportioned to the 24 outlying grids by inspection of maps indicating miles of highway in each grid. Diesel motor vehicle fuel was apportioned using the same factors developed for gasoline apportionment (e.g., if 1% of the county total of

gasoline powered vehicle miles were driven in a grid, it was assumed that 1% of the diesel vehicle miles were also driven in that grid)..

4.2 Shawnee County (Topeka)

Apportioning data were obtained from the Topeka Area Planning Study - Statistics Report, prepared for the Topeka-Shawnee County Regional Planning Commission, Topeka, Kansas.

Residential and commercial-institutional fuel were apportioned to individual grids using the ratio of the 1968 population in that grid to the county population. Open burning and incineration were apportioned using the same factors. Industrial fuel was apportioned using the ratio of the number of employees in heavy and light industry in a grid to the county total of such employees. Solvent emissions were apportioned on the basis of the ratio of the number of "heavy and light industry employees" and "all other employees" in a grid to the county total of such employees.

Motor vehicle emissions were calculated using the traffic count method. Traffic data were available for 22 of the 31 grids. Approximately 80% of the vehicle miles, as listed by the Kansas Highway Commission, were accounted for by this method. The remaining 20% were apportioned to the outlying grids by inspection of roadmaps detailing highway mileage in each grid.

4.3 Leavenworth and Johnson Counties

The ratio of the population in each grid to the county population was used to apportion the following:

- domestic fuel usage
- commercial-institutional fuel usage
- open burning
- incineration
- solvent evaporation.

Industrial fuel usage was apportioned by inspection of area maps. Motor vehicle emissions, both gasoline and diesel, were previously calculated in the OAP survey. These are listed in the "print-out" as "hand-calculated" emissions. Also included under hand calculated emissions are fuel combustion emissions from railroad and barge operations.

4.4 Wyandotte County

Emissions in Wyandotte County were previously estimated and apportioned to grids by the Wyandotte County Department of Health. The emissions were presented as a grid total. Included in the totals, where applicable, are the emissions from the following sources:

- residential fuel combustion
- commercial-institutional fuel combustion
- industrial fuel combustion
- mobile sources
  - * motor vehicles
  - * aircraft
  - * railroad
  - * vessels
- solid waste disposal.

Solvent emissions are listed separately under hand calculated emissions.

4.5 Area Maps

The following figures illustrate the grid systems and point source locations for Sedgwick and Shawnee Counties:

Figure 4.1 - UTM Grid System for Sedgwick County

Figure 4.2 - UTM Grid System for Shawnee County

Figure 4.3 - UTM Grid System for the Kansas Portion of the Kansas City Interstate AQCR

Figure 4.4 - Location of Point Sources in Sedgwick County

Figure 4.5 - Location of Point Sources in Shawnee County

Figure 4.6 - Location of Point Sources in the Kansas Portion of the Kansas City Interstate AQCR.

The source numbers on Figures 4.4 through 4.6 are the individual source numbers used in the computer listing. Tables 4.1 and 4.2 link the source number to the firm name for Figures 4.4 and 4.5 respectively. Because of a confidentiality clause in the enabling ordinance under which the Division of Air Pollution, Wyandotte County Department of Health operates, the names of individual point sources were not released for the majority of the sources in the Kansas portion of the Kansas City Interstate AQCR.

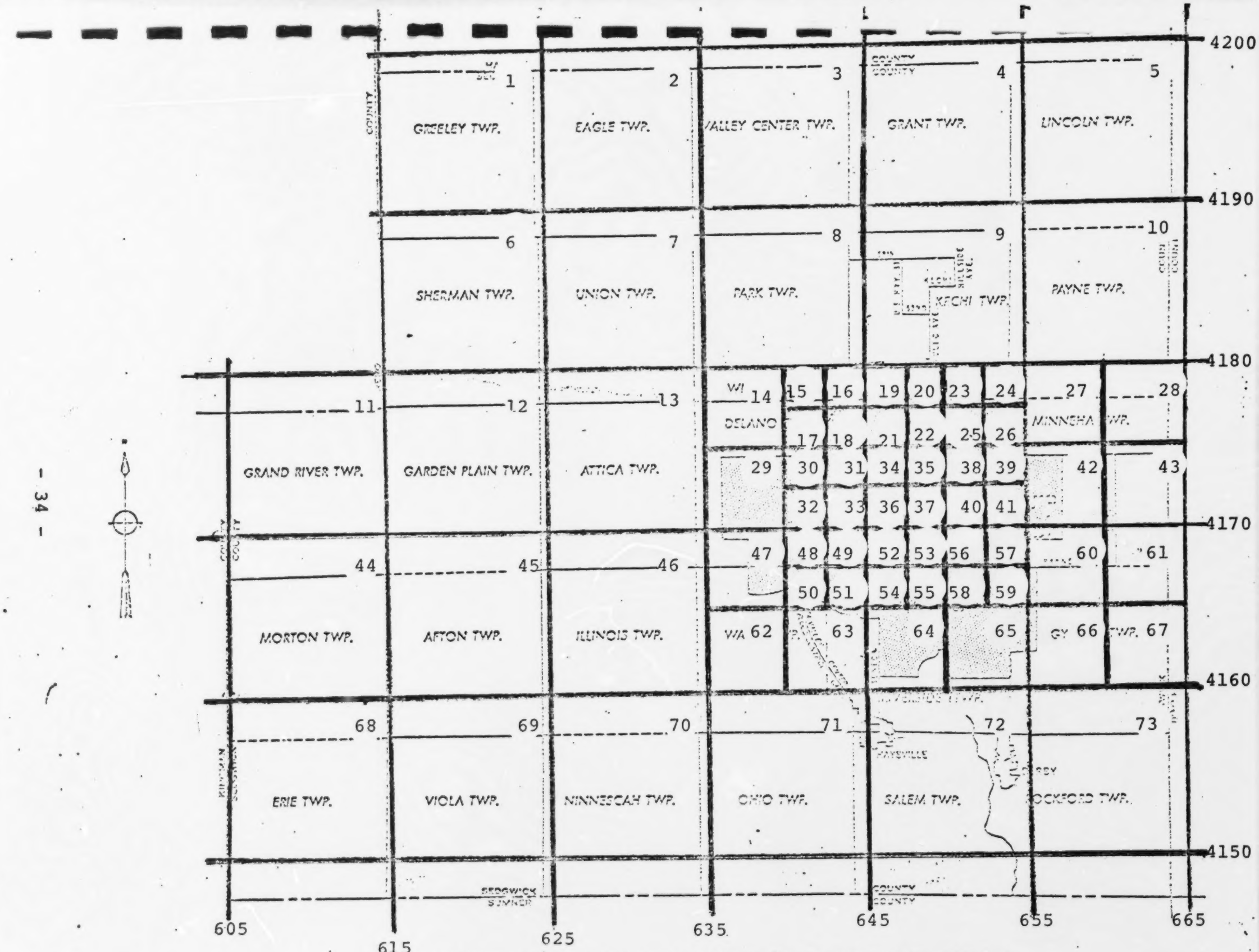


FIGURE 4.1 - UTM GRID SYSTEM FOR SEDGEWICK COUNTY

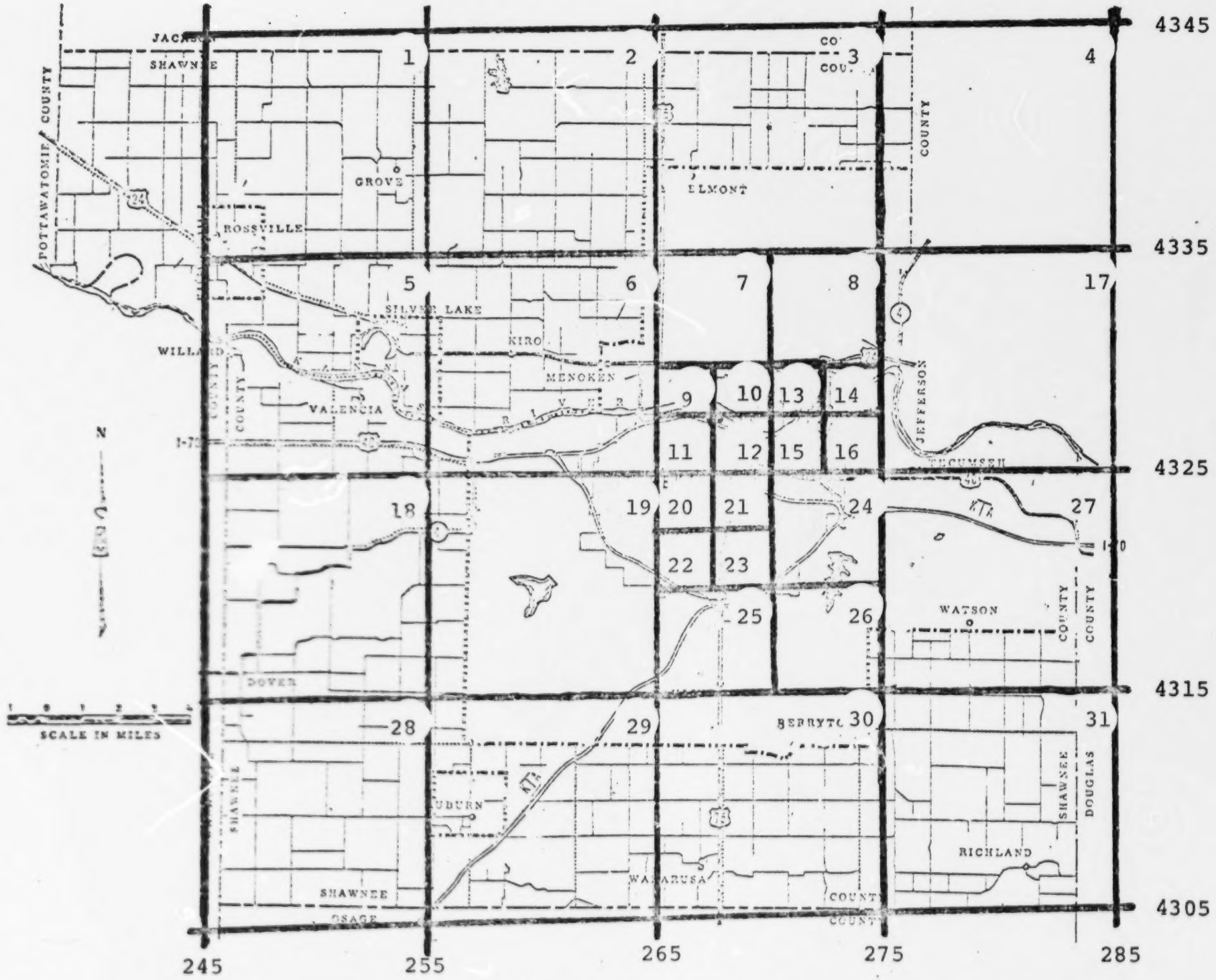


FIGURE 4.2 - UTM GRID SYSTEM FOR SHAWNEE COUNTY

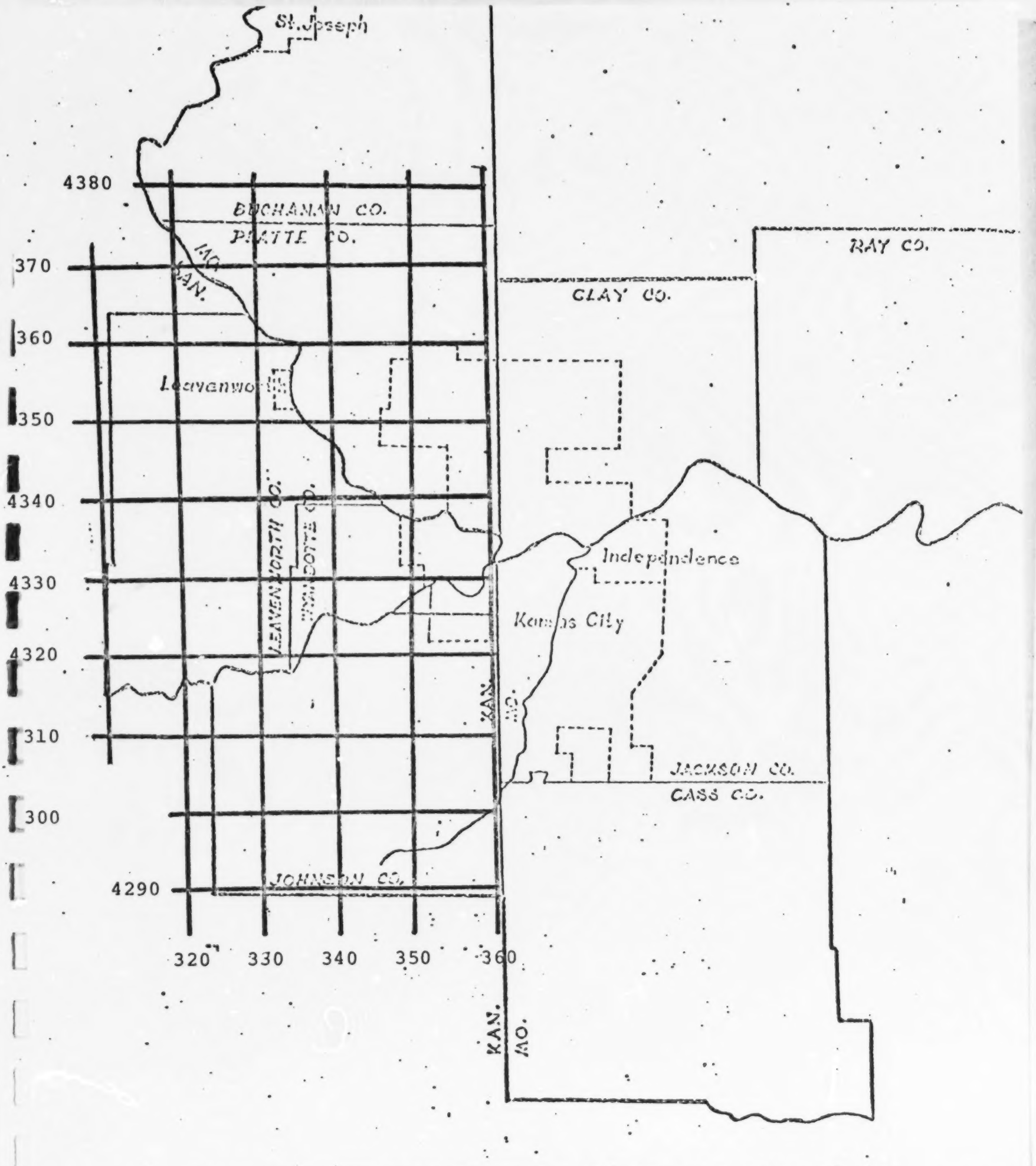
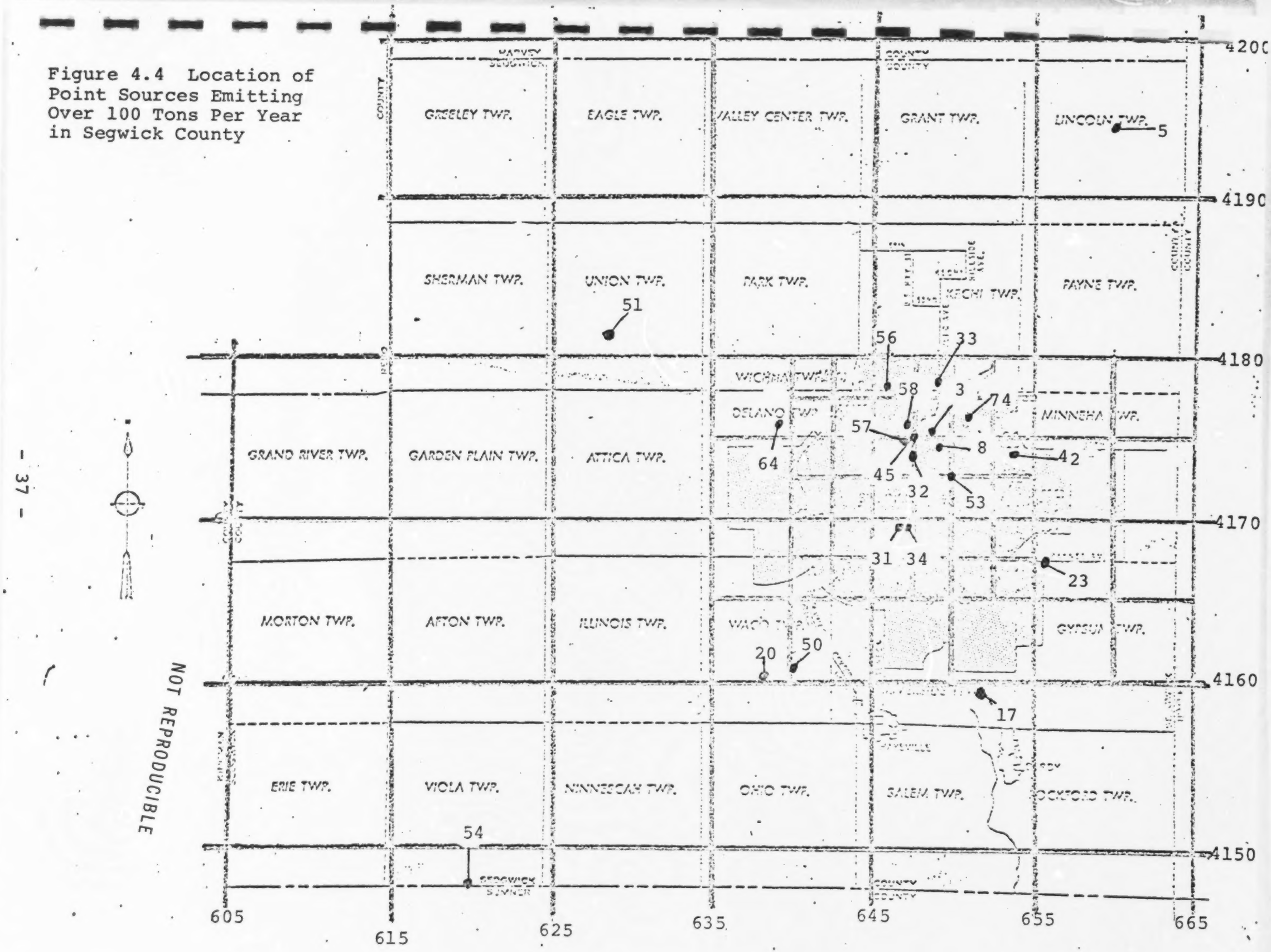


Figure 4.3 UTM Grid System for the Kansas Portion of the Kansas City Interstate AQCR.

Figure 4.4 Location of Point Sources Emitting Over 100 Tons Per Year in Segwick County



NOT REPRODUCIBLE

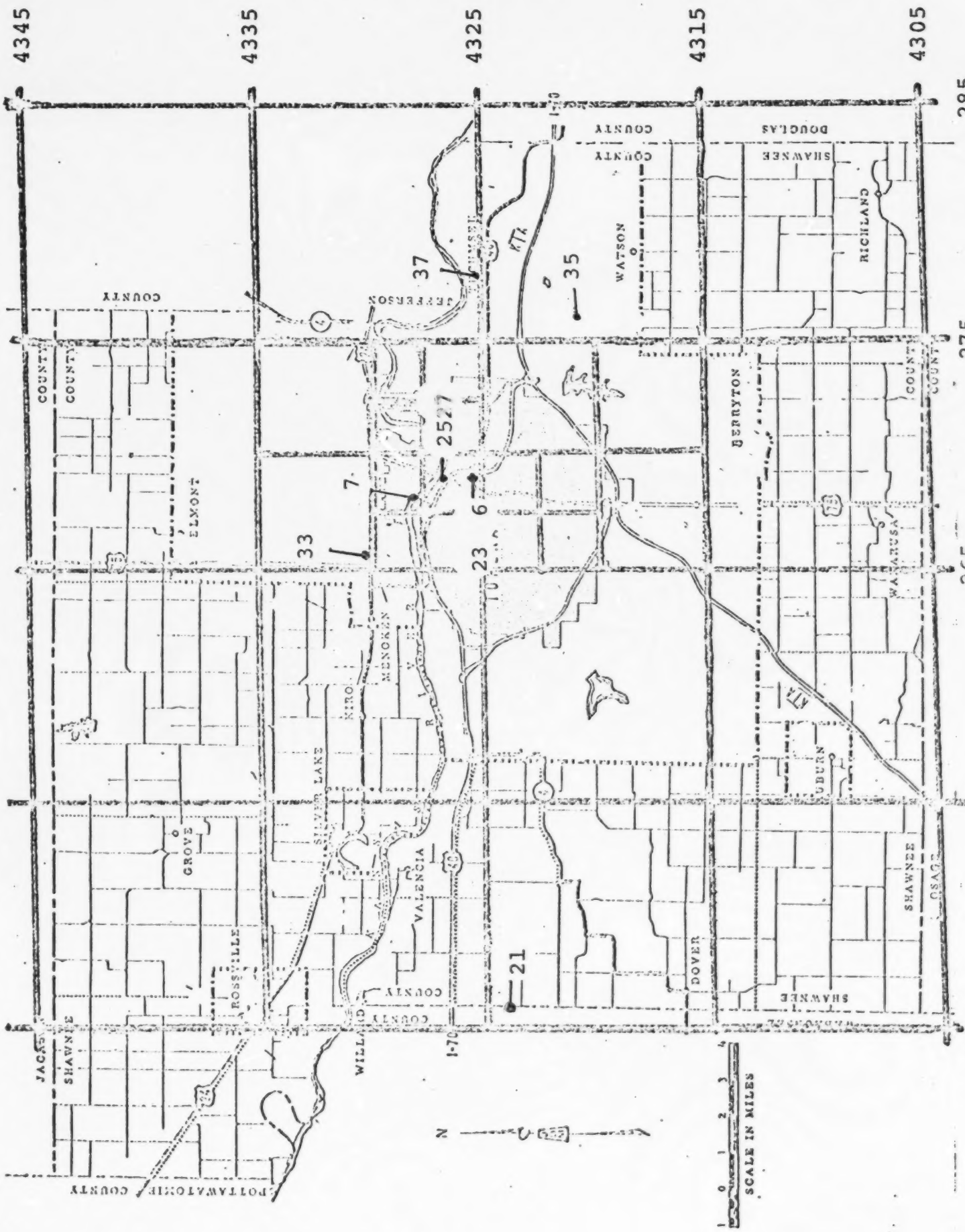


Figure 4.5 Location of Point Sources Emitting Over 100 Tons Per Year in Shawnee County.

NOT REPRODUCIBLE

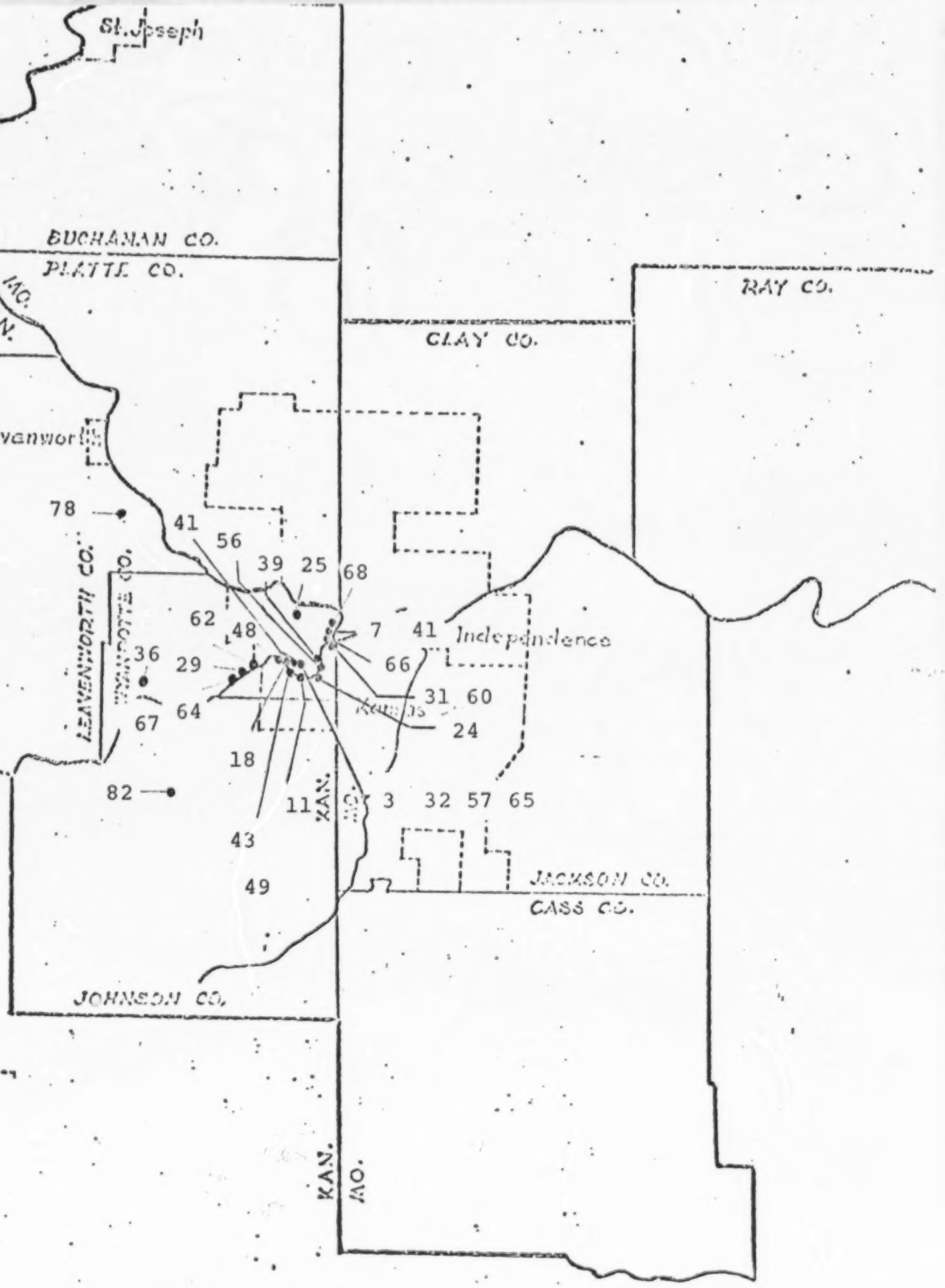


Figure 4.6 Location of Point Sources Emitting Over 100 Tons Per Year in the Kansas Portion of the Kansas City Interstate AQCR.

Table 4.4 POINT SOURCES IN SEDGWICK EMITTING 100 TONS PER YEAR OF MORE OF ANY POLLUTANT

Source #	Firm
3	Wichita Flour Mills
5	Furley Grain
8	Ross Industries
20	Vulcan Chemical Co.
23	McConnell Air Force Base
31	Grede Foundries
32	Service Iron Foundry
33	Ferrolay Foundry
36	Ehrsam Wichita Foundry
42	Standard Press Steel
45	Cargill Inc.
50	Kansas Gas & Electric
51	Kansas Gas & Electric
53	Kansas Gas & Electric
54	Garvey Grain
56	SP Wallingford
57	Ross Industries
58	Wichita Flour Mills
64	Ritchie Construction
74	Derby Refining
77	Derby Refining

Table 4.5 POINT SOURCES IN SHAWNEE COUNTY EMITTING 100 TONS OR MORE OF ANY POLLUTANT

Source #	Firm
6	Ismert-Hincke
7	Thompson-Dehydrating
21	Berry Grain
23	Ismert-Hincke
25	Topeka Terminal Elevator
27	Rodney Milling
33	Goodyear Tire and Rubber
35	Concrete Material
37	Kansas Power & Light
38	Kansas Power & Light

5.0 EMISSIONS INVENTORY DATA

Point and area source emissions are summarized by region in Tables 5.1 through 5.7. Data in these tables are based upon information in the point and area source computer print-outs, and the country point source emission totals and fuel usage listings prepared by the Kansas State Agency.

Figures 5.1 through 5.7 provide a visual summary for each AQCR of the major sources of emission of each pollutant.

Table 5.1

EMISSIONS INVENTORY SUMMARY

For the State of Kansas

Kansas Portion of the Kansas City Interstate Air Quality Control Region

Data Representative of Calendar Year 1970

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
I. FUEL COMBUSTION							
A. Residential Fuel-Area Source							
1. Coal	84	619	185	44	19	7407	TONS
2. Distillate Oil	23	54	11	7	28	4500	KGAL
3. Natural Gas	225	7	237	95	890	23725	MMCF
4. Wood							
5. Other							
6. TOTAL	332	715	433	292	937		
B. Comm.-Instl. & Industrial							
1.a Bituminous Coal-Area Source	5191	7206	714	194	519	99,299	TONS
b Bituminous Coal-Pt. Source							
2. Coke							
3.a Distillate Oil-Area Source	67	271	1	12	269	8945	KGAL
b Distillate Oil-Pt. Source	16	42	—	3	63	2104	KGAL
4.a Residual Oil-Area Source	62	274	—	3	163	5423	KGAL
b Residual Oil-Pt. Source	99	450	—	14	259	8611	KGAL
5.a Natural Gas-Area Source	67	2	40	82	434	2240	MMCF
b Natural Gas-Pt. Source	166	5	31	222	1465	18,264	KGAL
6. Process Gas-Pt. Source							
7.a Other-Area Source							
b Other-Pt. Source							
8. TOTAL	5668	8974	813	636	3176		
C. Steam-Electric Power Plant							
1. Anthracite Coal							
2. Bituminous Coal	505	12125	133	347	6709	265,100	TONS
3. Distillate Oil							
4. Residual Oil							
5. Natural Gas	58	4	3	210	1944	13,274	MMCF
6. Other	109	6151	24	12	2005		
7. TOTAL	692	23,280	160	630	10,658		
D. TOTAL FUEL COMBUSTION	6692	32,429	187	1564	14,286		
II. PROCESS LOSSES							
A. Point Sources	19,040	658	1300	6424	931		
B. Area Sources				1631			
III. SOLID WASTE DISPOSAL							
A. Incineration							
1.a On Site-Area Source	508	10	725	218	218	145,000	TONS
1.b On Site-Point Source	215	19	134	17	55	13,102	TONS

EMISSIONS INVENTORY SUMMARY

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit:
III. SOLID WASTE DISPOSAL (Cont'd.)							
B. Open Burning							
1.a On Site-Area Source	401	25	2130	252	150	50,106	TONS
1.b On Site-Point Source							
2.a Dumps-Area Source							
2.b Dumps-Point Source	712	18	1272	1184	87	36,000	TONS
C. TOTAL SOLID WASTE DISPOSAL	1836	181	4266	2171	485		
IV. TRANSPORTATION- AREA SOURCE							
A. Motor Vehicles-Gasoline	622	316	192,061	32,412	18,664	1,884,360	KLTRS
Motor Vehicles-Diesel	840	1601	11,565	2312	12,599	71,164	KLTRS
B. Off Highway Fuel Usage							
C. Aircraft							
D. Railroad	1231	2461	2728	2663	3994	106,500	KGAL
E. Vessels	7	178	18	14	20	563	KGAL
F. Gasoline Handling				3041			
G. Other							
H. TOTAL TRANSPORTATION	2850	5616	21,372	40,345	34,777		
V. MISCELLANEOUS-AREA SOURCE							
A. Agricultural Burning							
B. Solvent				2759			
C. TOTAL MISCELLANEOUS				2759			
VI. GRAND TOTAL							
A. AREA SOURCE	9478	11,452	216,442	46,312	32,471		
B. POINT SOURCE	20,940	24,470	3055	8600	13,478		
C. TOTAL	30,418	35,922	119,497	54,912	45,082		

Table 5.2

EMISSIONS INVENTORY SUMMARY

For the State of Kansas

Northeast Intrastate Air Quality Control Region

Data Representative of Calendar Year 1970

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
I. FUEL COMBUSTION							
A. Residential Fuel-Area Source							
1. Coal	156	1146	342	81	33	13,700	Tons
2. Distillate Oil	47	181	24	17	55	9300	K Gal
3. Natural Gas	141	3	150	61	577	14,881	MMCF
4. Wood							
5. Other							
6. TOTAL	344	1330	516	159	665		
B. Comm.-Instl. & Industrial							
1.a Bituminous Coal-Area Source	440	734	117	30	42	8784	Tons
b Bituminous Coal-Pt. Source	—	4	—	—	—	64	Tons
2. Coke							
3.a Distillate Oil-Area Source	27	70	—	2	108	3619	KGal
b Distillate Oil-Pt. Source	8	21	—	2	43	1248	KGal
4.a Residual Oil-Area Source	55	453	—	6	143	4746	K Gal
b Residual Oil-Pt. Source	18	150	—	2	47	1567	K Gal
5.a Natural Gas-Area Source	308	9	84	550	2560	33,756	MMCF
b Natural Gas-Pt. Source	105	2	3	202	903	12,414	MMCF
6. Process Gas-Pt. Source							
7.a Other-Area Source							
b Other-Pt. Source							
8. TOTAL	961	1493	204	794	3804		
C. Steam-Electric Power Plant							
1. Anthracite Coal							
2. Bituminous Coal	876	3770	36	11	731	64,000	Tons
3. Distillate Oil	274	10	7	733	7186	369	KGal
4. Residual Oil	39	26	224	42	233	17,596	MMCF
5. Natural Gas							
6. Other							
7. TOTAL	1189	3806	267	786	8150		
D. TOTAL FUEL COMBUSTION	2494	6579	987	1739	12619		
II. PROCESS LOSSES							
A. Point Sources	14986	0	18	240	196		
B. Area Sources				2271			
III. SOLID WASTE DISPOSAL							
A. Incineration							
1.a On Site-Area Source	516	111	737	221	221	147,300	Tons
1.b On Site-Point Source							

EMISSIONS INVENTORY SUMMARY

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
III. SOLID WASTE DISPOSAL (Cont'd.)							
B. Open Burning							
1.a On Site-Area Source	1942	125	10,203	5684	726	242,424	TONS
1.b On Site-Point Source							
2.a Dumps-Area Source							
2.b Dumps-Point Source							
C. TOTAL SOLID WASTE DISPOSAL	2458	236	11,040	5905	947		
IV. TRANSPORTATION- AREA SOURCE							
A. Motor Vehicles-Gasoline	693	420	153,324	28,551	23,683	2,098,901	KVCHI
Motor Vehicles-Diesel	188	337	2445	485	2558	15,053	KVCHI
B. Off Highway Fuel Usage							
C. Aircraft	529	179	7163	1907	231		
D. Railroad	212	548	591	421	633	16,874	KGAL
E. Vessels							
F. Gasoline Handling				1962			
G. Other							
H. TOTAL TRANSPORTATION	1672	1484	163,528	33,326	27,105		
V. MISCELLANEOUS-AREA SOURCE							
A. Agricultural Burning	285	—	1668	338	34	33,250	TONS
B. Solvent	—	—	—	1616	—		
C. TOTAL MISCELLANEOUS	285	—	1668	1954	34		
VI. GRAND TOTAL							
A. AREA SOURCE	5589	8122	176,955	44,203	31,604		
B. POINT SOURCE	16,306	177	288	1252	9297		
C. TOTAL	21,895	8299	177,241	45,435	40,901		

Table 5.3

EMISSIONS INVENTORY SUMMARY

For the State of Kansas

North Central Intrastate Air Quality Control Retion

Data Representative of Calendar Year 1970

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
I. FUEL COMBUSTION							
A. Residential Fuel-Area Source							
1. Coal	79	583	174	42	17	6970	TONS
2. Distillate Oil	27	107	13	8	32	5569	KGAL
3. Natural Gas	117	4	123	50	462	12315	MMCF
4. Wood							
5. Other							
6. TOTAL	223	[illegible]	310	100	511		
B. Comm.-Instl. & Industrial							
1.a Bituminous Coal-Area Source	226	474	106	26	22	5674	TONS
b Bituminous Coal-Pt. Source							
2. Coke							
3.a Distillate Oil-Area Source	23	[illegible]	—	4	89	3020	KGAL
b Distillate Oil-Pt. Source	3	5	—	—	9	246	KGAL
4.a Residual Oil-Area Source	19	155	—	82	49	1626	KGAL
b Residual Oil-Pt. Source	8	65		6	21	691	KGAL
5.a Natural Gas-Area Source	196	6	76	308	1496	21262	MMCF
b Natural Gas-Pt. Source	50	2	1	155	684	26844	MMCF
6. Process Gas-Pt. Source	42	2	1	105	454	5250	MMCF
7.a Other-Area Source							
b Other-Pt. Source							
8. TOTAL	572	[illegible]	184	606	2829		
C. Steam-Electric Power Plant							
1. Anthracite Coal							
2. Bituminous Coal							
3. Distillate Oil							
4. Residual Oil	6	17	137	35	157	1373	KGAL
5. Natural Gas	21	—	—	45	559	3982	MMCF
6. Other							
7. TOTAL	27	17	137	80	718		
D. TOTAL FUEL COMBUSTION	822	1176	631	786	4058		
II. PROCESS LOSSES							
A. Point Sources	18701	6424	26	1860	483		
B. Area Sources				2004			
III. SOLID WASTE DISPOSAL							
A. Incineration							
1.a On Site-Area Source	—	—	—	—			
1.b On Site-Point Source							

EMISSIONS INVENTORY SUMMARY

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
III. SOLID WASTE DISPOSAL (Cont'd.)							
B. Open Burning							
1.a On Site-Area Source	1702	106	9041	3191	638	212,741	TONS
1.b On Site-Point Source							
2.a Dumps-Area Source							
2.b Dumps-Point Source							
C. TOTAL SOLID WASTE DISPOSAL	1702	106	9041	3191	638		
IV. TRANSPORTATION- AREA SOURCE							
A. Motor Vehicles-Gasoline	520	315	111,501	21,022	17,935	4575.400	KVMH
Motor Vehicles-Diesel	178	317	2289	458	2,344	14,085	KVMH
B. Off Highway Fuel Usage							
C. Aircraft	297	90	3538	965	119		
D. Railroad	107	278	300	213	220	8539	KGal
E. Vessels							
F. Gasoline Handling				1405			
G. Other							
H. TOTAL TRANSPORTATION	1102	1000	117,628	24,063	20,768		
V. MISCELLANEOUS-AREA SOURCE							
A. Agricultural Burning	255	—	1490	300	30	29,750	Tons
B. Solvent				711			
C. TOTAL MISCELLANEOUS	255	—	1490	1011	30		
VI. GRAND TOTAL							
A. AREA SOURCE	3746	2491	128,651	30,709	23,603		
B. POINT SOURCE	18,836	6515	659	2206	2374		
C. TOTAL	22,582	9006	310	33621	25,977		

Table 5.4

EMISSIONS INVENTORY SUMMARY

For the State of Kansas

Northwest Intrastate Air Quality Control Region

Data Representative of Calendar Year 1970

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
I. FUEL COMBUSTION							
A. Residential Fuel-Area Source							
1. Coal							
2. Distillate Oil	45	334	100	24	10	4000	TONS
3. Natural Gas	17	84	9	5	21	3442	KGAL
4. Wood	77	2	81	32	303	8093	MMCF
5. Other							
6. TOTAL							
	139	403	190	61	334		
B. Comm.-Instl. & Industrial							
1.a Bituminous Coal-Area Source	141	347	92	22	13	4153	TONS
b Bituminous Coal-Pt. Source							
2. Coke							
3.a Distillate Oil-Area Source	19	47	—	4	25	2505	KGAL
b Distillate Oil-Pt. Source	8	20	—	1	31	1051	KGAL
4.a Residual Oil-Area Source	7	55	—	1	17	572	KGAL
b Residual Oil-Pt. Source	4	33	—	5	10	346	KGAL
5.a Natural Gas-Area Source	153	5	55	232	1140	16,631	MMCF
b Natural Gas-Pt. Source	53	1	1	113	494	5641	MMCF
6. Process Gas-Pt. Source	5	0	0	10	45	510	MMCF
7.a Other-Area Source							
b Other-Pt. Source							
8. TOTAL							
	390	507	158	388	1825		
C. Steam-Electric Power Plant							
1. Anthracite Coal							
2. Bituminous Coal							
3. Distillate Oil							
4. Residual Oil							
5. Natural Gas	23	145	265	55	405	4097	KGAL
6. Other	67	2	0	18	1850	9884	MMCF
7. TOTAL							
	90	147	265	73	2255		
D. TOTAL FUEL COMBUSTION	619	1060	613	522	4414		
II. PROCESS LOSSES							
A. Point Sources	2619	16	33	212	353		
B. Area Sources				1594			
III. SOLID WASTE DISPOSAL							
A. Incineration							
1.a On Site-Area Source							
1.b On Site-Point Source							

EMISSIONS INVENTORY SUMMARY

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Units
III. SOLID WASTE DISPOSAL (Cont'd.)							
B. Open Burning							
1.a On Site-Area Source	1321	83	7016	2476	495	165,089	TONS
1.b On Site-Point Source							
2.a Dumps-Area Source							
2.b Dumps-Point Source							
C. TOTAL SOLID WASTE DISPOSAL	1321	83	7016	2476	495		
IV. TRANSPORTATION- AREA SOURCE							
A. Motor Vehicles-Gasoline	415	251	86,718	16,512	14,376	1,256,[illegible]	KYEAR
Motor Vehicles-Diesel	226	326	2345	468	2235	14,457	KYEAR
B. Off Highway Fuel Usage							
C. Aircraft							
D. Railroad	69	180	195	138	208	5550	KGAL
E. Vessels							
F. Gasoline Handling				987			
G. Other							
H. TOTAL TRANSPORTATION	710	757	89,250	18,105	16,859		
V. MISCELLANEOUS-AREA SOURCE							
A. Agricultural Burning							
B. Solvent				416			
C. TOTAL MISCELLANEOUS				416			
VI. GRAND TOTAL							
A. AREA SOURCE	2490	[illegible]	96,613	22,911	18,915		
B. POINT SOURCE	2779	217	299	414	3188		
C. TOTAL	5269	[illegible]	96,912	23,325	22,101		

Table 5.5

EMISSIONS INVENTORY SUMMARY

For the State of Kansas

Southeast Intrastate Air Quality Control Region

Data Representative of Calendar Year 1970

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
I. FUEL COMBUSTION							
A. Residential Fuel-Area Source							
1. Coal	314	2285	695	167	70	27806	TONS
2. Distillate Oil	15	2	7	4	18	2771	KGAL
3. Natural Gas	125	4	121	53	495	13,152	MMCF
4. Wood							
5. Other							
6. TOTAL	454	2387	823	224	580		
B. Comm.-Instl. & Industrial							
1.a Bituminous Coal-Area Source	372	633	90	23	89	7449	TONS
b Bituminous Coal-Pt. Source	4	234	20	6	12	4000	TONS
2. Coke							
3.a Distillate Oil-Area Source	21	56	—	4	86	2859	KGAL
b Distillate Oil-Pt. Source						30	KGAL
4.a Residual Oil-Area Source	51	[illegible]	—	7	134	4465	KGAL
b Residual Oil-Pt. Source	30	246	—	4	78	2610	KGAL
5.a Natural Gas-Area Source	140	6	62	353	1584	11790	MMCF
b Natural Gas-Pt. Source	79	2	1	179	780	2491	MMCF
6. Process Gas-Pt. Source							
7.a Other-Area Source							
b Other-Pt. Source	69	1	1	154	405	23,013	KGAL
8. TOTAL	836	1578	174	699	3120		
C. Steam-Electric Power Plant							
1. Anthracite Coal							
2. Bituminous Coal	4	12	5	2	216	638	TONS
3. Distillate Oil							
4. Residual Oil	8	12	37	9	103	1492	KGAL
5. Natural Gas	34	3	2	211	2025	10650	MMCF
6. Other							
7. TOTAL	46	32	44	222	2344		
D. TOTAL FUEL COMBUSTION	1336	5[illegible]	1051	1145	6044		
II. PROCESS LOSSES							
A. Point Sources	76110	6	1572	63	1118		
B. Area Sources				2633			
III. SOLID WASTE DISPOSAL							
A. Incineration							
1.a On Site-Area Source							
1.b On Site-Point Source							

EMISSIONS INVENTORY SUMMARY

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Units
III. SOLID WASTE DISPOSAL (Cont'd.)							
B. Open Burning							
1.a On Site-Area Source	1855	116	9854	3478	696	199,794	TONS
1.b On Site-Point Source							
2.a Dumps-Area Source							
2.b Dumps-Point Source							
C. TOTAL SOLID WASTE DISPOSAL	1855	116	9854	3478	696		
IV. TRANSPORTATION- AREA SOURCE							
A. Motor Vehicles-Gasoline	549	233	116,644	22,085	19,030	1,665,900	KVEH MI
Motor Vehicles-Diesel	171	308	2223	445	2326	13,682	KVEH MI
B. Off Highway Fuel Usage							
C. Aircraft							
D. Railroad	155	402	432	309	464	12,368	KGAL
E. Vessels							
F. Gasoline Handling				1334			
G. Other							
H. TOTAL TRANSPORTATION	875	1043	119,299	24,173	21,810		
V. MISCELLANEOUS-AREA SOURCE							
A. Agricultural Burning	465	—	2,714	544	54	54,250	TONS
B. Solvent				2242			
C. TOTAL MISCELLANEOUS	465	—	2,714	2786	54		
VI. GRAND TOTAL							
A. AREA SOURCE	4113	1621	132,852	33,650	24,928		
B. POINT SOURCE	76,528	511	1638	628	4,794		
C. TOTAL	80,641	5132	134,490	34,278	29,722		

Table 5.6

EMISSIONS INVENTORY SUMMARY

For the State of Kansas

South Central Intrastate Air Quality Control Region

Data Representative of Calendar Year 1970

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
I. FUEL COMBUSTION							
A. Residential Fuel-Area Source							
1. Coal	50	369	110	26	11	4915	Tons
2. Distillate Oil	20	76	10	6	23	3902	KGal
3. Natural Gas	124	4	130	52	489	13,050	MMCF
4. Wood							
5. Other							
6. TOTAL	194	449	250	84	523		
B. Comm.-Instl. & Industrial							
1.a Bituminous Coal-Area Source	1321	1970	241	62	132	23,564	Tons
b Bituminous Coal-Pt. Source	2	138	12	4	7	2420	Tons
2. Coke							
3.a Distillate Oil-Area Source	61	158	1	12	243	8112	KGal
b Distillate Oil-Pt. Source	33	90	–	7	133	4448	KGal
4.a Residual Oil-Area Source	185	1534	2	24	482	16,078	KGal
b Residual Oil-Pt. Source	27	144	–	2	55	3542	KGal
5.a Natural Gas-Area Source	658	22	168	1192	5528	72177	MMCF
b Natural Gas-Pt. Source	880	9	92	1809	8126	97592	MMCF
6. Process Gas-Pt. Source	74	2	2	164	716	8176	MMCF
7.a Other-Area Source							
b Other-Pt. Source							
8. TOTAL	3241	4,067	518	3276	15,422		
C. Steam-Electric Power Plant							
1. Anthracite Coal							
2. Bituminous Coal							
3. Distillate Oil	23	60	–	5	90	3000	KGal
4. Residual Oil	18	89	87	22	241	7247	KGal
5. Natural Gas	538	21	35	1438	14001	66,769	MMCF
6. Other							
7. TOTAL	579	170	122	1465	14332		
D. TOTAL FUEL COMBUSTION	4014	4686	890	4825	30,277		
II. PROCESS LOSSES							
A. Point Sources	14,980	1028	1109	661	9832		
B. Area Sources				4616			
III. SOLID WASTE DISPOSAL							
A. Incineration							
1.a On Site-Area Source	1,445	310	2065	619	619	412,996	Tons
1.b On Site-Point Source							

EMISSIONS INVENTORY SUMMARY

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
III. SOLID WASTE DISPOSAL (Cont'd.)							
B. Open Burning							
1.a On Site-Area Source	2242	140	11,911	4204	841	280,260	TONS
1.b On Site-Point Source							
2.a Dumps-Area Source							
2.b Dumps-Point Source							
C. TOTAL SOLID WASTE DISPOSAL	3682	450	13,976	4,833	1460		
IV. TRANSPORTATION- AREA SOURCE							
A. Motor Vehicles-Gasoline	1040	620	245,206	44,628	34859	2,150,000	K GAL
Motor Vehicles-Diesel	290	522	3720	954	3444	52,200	K GAL
B. Off Highway Fuel Usage							
C. Aircraft							
D. Railroad	253	658	709	506	760	20,256	K GAL
E. Vessels							
F. Gasoline Handling				3080			
G. Other							
H. TOTAL TRANSPORTATION	1583	1810	250,125	48,968	39,563		
V. MISCELLANEOUS-AREA SOURCE							
A. Agricultural Burning	255	—	1488	298	30	23,450	TONS
B. Solvent				4576			
C. TOTAL MISCELLANEOUS	255	—	1488	4874	30		
VI. GRAND TOTAL							
A. AREA SOURCE	7944	[illegible]	266,311	64,675	42,960		
B. POINT SOURCE	16,575	1871	1357	4112	33,201		
C. TOTAL	24,519	[illegible]	247,648	68,787	8162		

Table 5.7

EMISSIONS INVENTORY SUMMARY

For the State of Kansas

Southwest Intrastate Air Quality Control Region

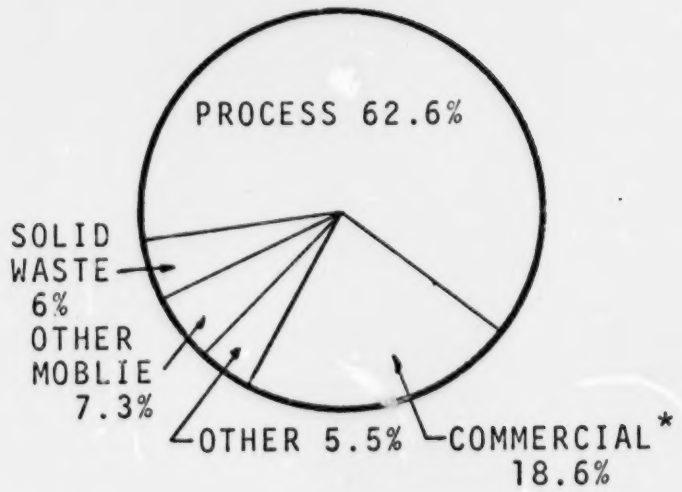
Data Representative of Calendar Year 1970

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
I. FUEL COMBUSTION							
A. Residential Fuel-Area Source							
1. Coal	24	176	53	13	5	2105	TONS
2. Distillate Oil	25	19	13	8	21	5011	K-GAL
3. Natural Gas	74	2	78	31	292	7798	MMCF
4. Wood							
5. Other							
6. TOTAL	123	277	144	52	328		
B. Comm.-Instl. & Industrial							
1.a Bituminous Coal-Area Source	171	366	84	21	16	4377	TONS
b Bituminous Coal-Pt. Source							
2. Coke							
3.a Distillate Oil-Area Source	18	73	—	3	71	2324	K GAL
b Distillate Oil-Pt. Source	2	6	—	—	8	227	K GAL
4.a Residual Oil-Area Source	13	111	—	2	35	1163	K GAL
b Residual Oil-Pt. Source	—		—	—	—	43	K GAL
5.a Natural Gas-Area Source	163	6	60	264	1269	12891	
b Natural Gas-Pt. Source	27	1	0	162	736	4423	MMCF
6. Process Gas-Pt. Source	30	1	1	68	296	2401	MMCF
7.a Other-Area Source							
b Other-Pt. Source	97	5	2	216	647	30,805	K GAL
8. TOTAL	571	842	147	741	3098		
C. Steam-Electric Power Plant							
1. Anthracite Coal							
2. Bituminous Coal							
3. Distillate Oil							
4. Residual Oil	11	18	146	27	182	1611	K GAL
5. Natural Gas	118	3	2	327	3243	16,665	MMCF
6. Other							
7. TOTAL	129	21	148	356	3425		
D. TOTAL FUEL COMBUSTION	823	840	459	1149	6851		
II. PROCESS LOSSES							
A. Point Sources	4951	—	596	10148	4		
B. Area Sources				1456			
III. SOLID WASTE DISPOSAL							
A. Incineration							
1.a On Site-Area Source	8	2	11	3	3	2248	TONS
1.b On Site-Point Source							

EMISSIONS INVENTORY SUMMARY

SOURCE CATEGORY	Tons of Pollutant/Year					Fuel, etc.	
	Part.	SO_2	CO	HC	NO_x	Quantity	Unit
III. SOLID WASTE DISPOSAL (Cont'd.)							
B. Open Burning							
1.a On Site-Area Source	1007	63	5337	1888	328	125,969	Tons
1.b On Site-Point Source							
2.a Dumps-Area Source							
2.b Dumps-Point Source							
C. TOTAL SOLID WASTE DISPOSAL	1015	65	5350	1891	581		
IV. TRANSPORTATION- AREA SOURCE							
A. Motor Vehicles-Gasoline	530	316	110,464	20,[illegible]	18,021	1,[illegible]	KVGH
Motor Vehicles-Diesel	176	317	2283	243	2397	14,108	KVDH
B. Off Highway Fuel Usage							
C. Aircraft							
D. Railroad	82	214	230	165	247	6[illegible]	KGal
E. Vessels							
F. Gasoline Handling				1418			
G. Other							
H. TOTAL TRANSPORTATION	780	847	113,979	22,764	[illegible]		
V. MISCELLANEOUS-AREA SOURCE							
A. Agricultural Burning							
B. Solvent				423			
C. TOTAL MISCELLANEOUS				423			
VI. GRAND TOTAL							
A. AREA SOURCE	2283	1719	118,617	22,176	[illegible]		
B. POINT SOURCE	5286	24	747	10,955	5116		
C. TOTAL	7569	1752	119,364	32,131	[illegible]		

PARTICULATE



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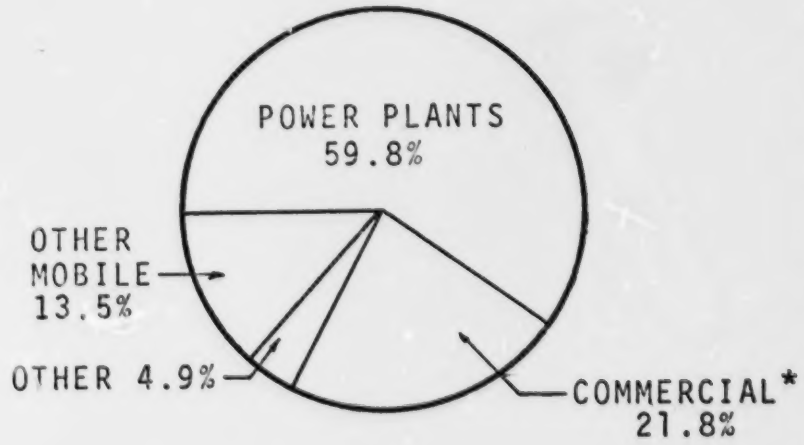

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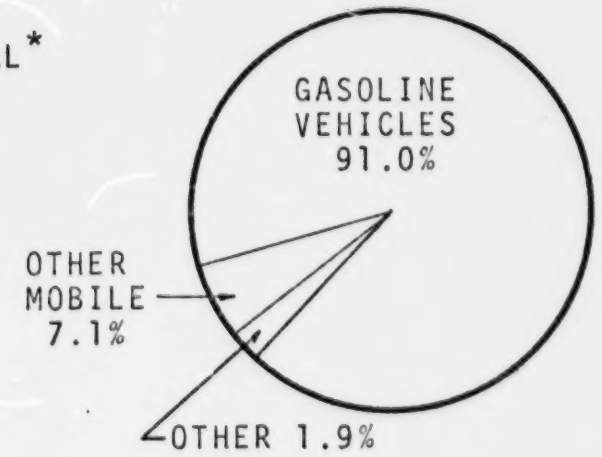

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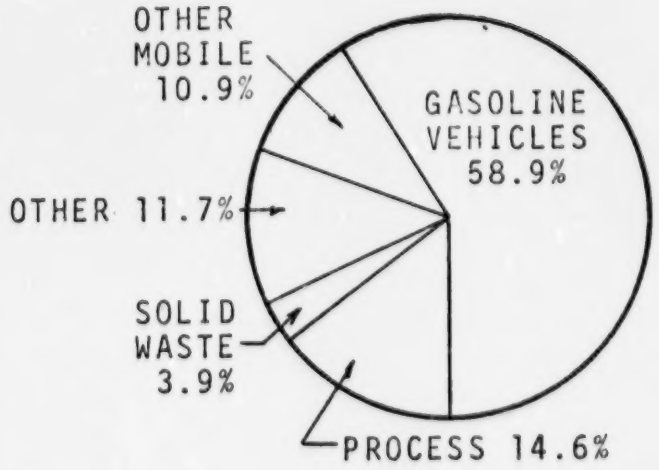

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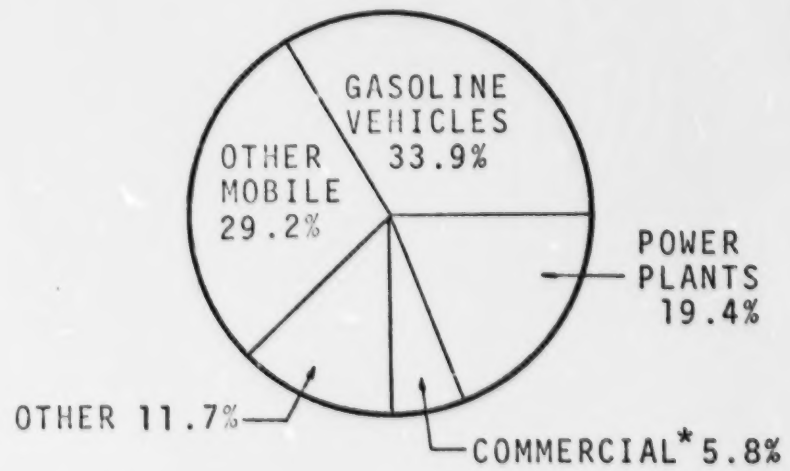
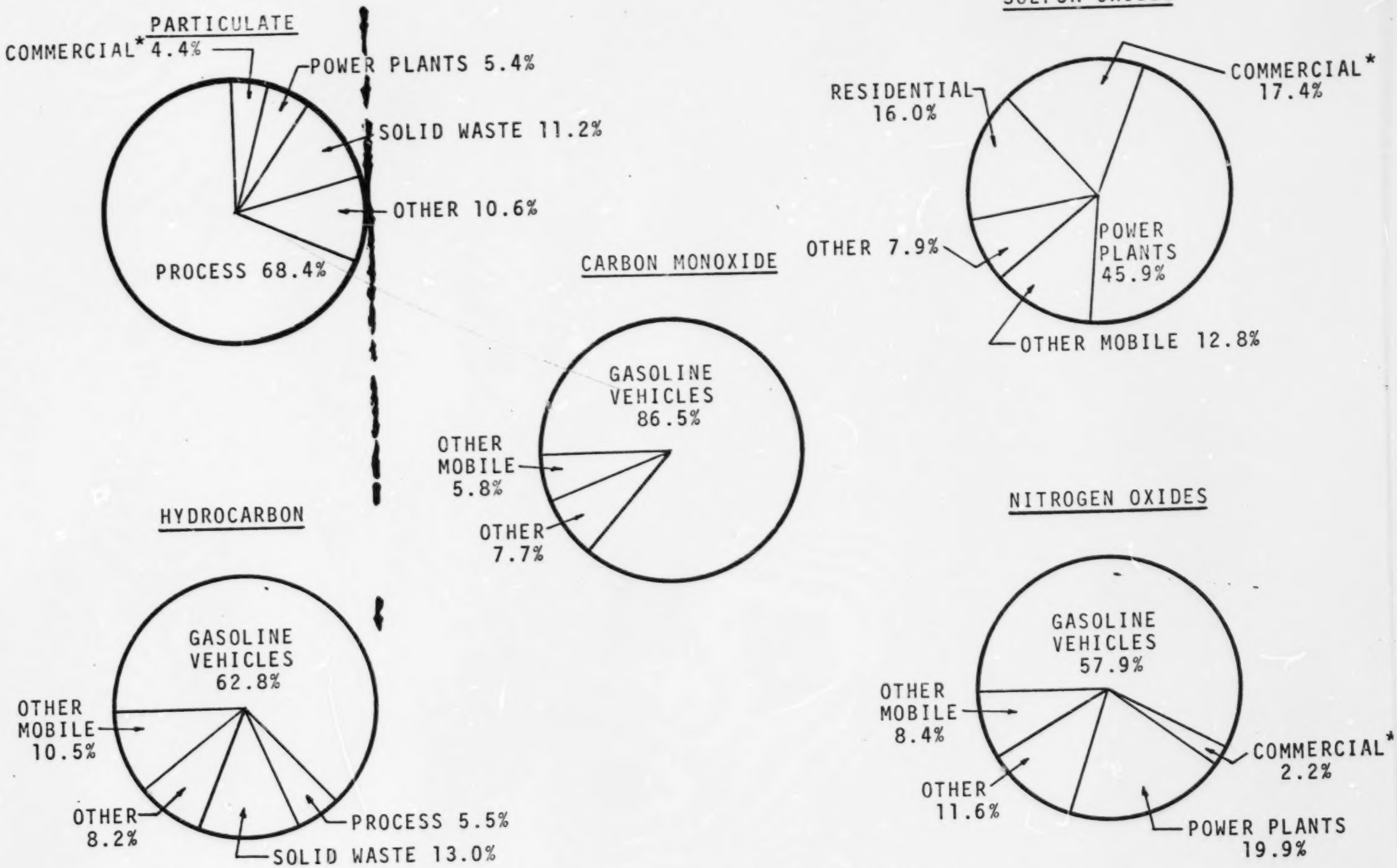


*INCLUDES INSTITUTIONAL & INDUSTRIAL FUEL

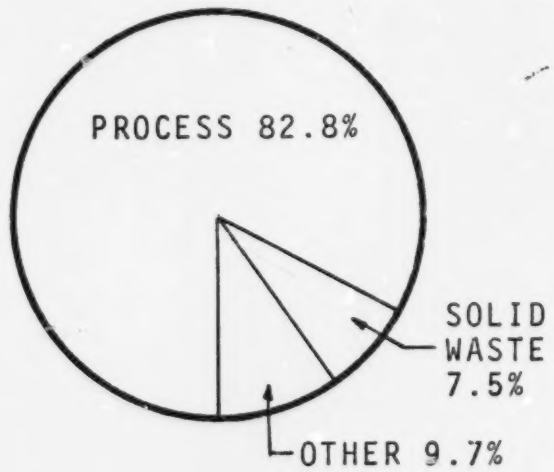
FIGURE 5.1 POLLUTANTS EMITTED BY PRINCIPAL SOURCES - KANSAS PORTION OF THE METROPOLITAN KANSAS CITY INTERSTATE AIR QUALITY CONTROL REGION



*INCLUDES INSTITUTIONAL & INDUSTRIAL FUEL

FIGURE 5.2 POLLUTANTS EMITTED BY PRINCIPAL SOURCES - NORTHEAST KANSAS INTRASTATE AIR QUALITY CONTROL REGION

PARTICULATE



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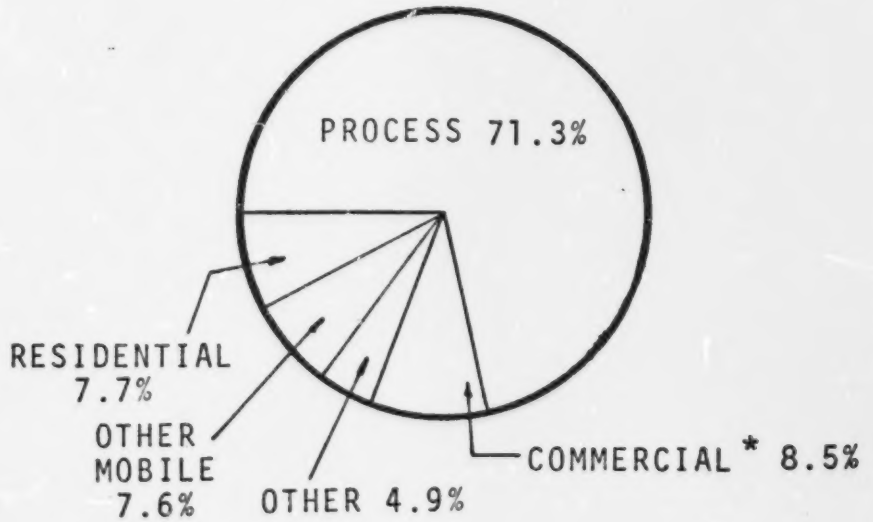
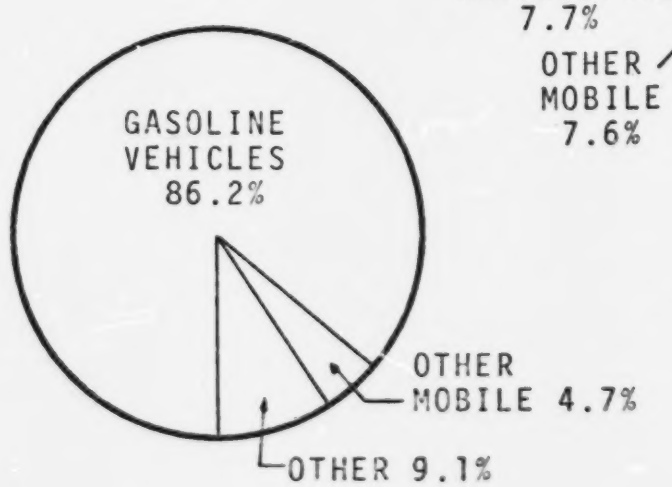
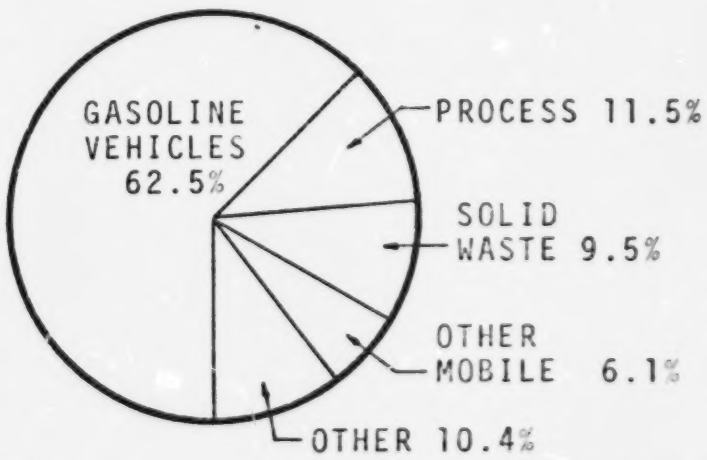


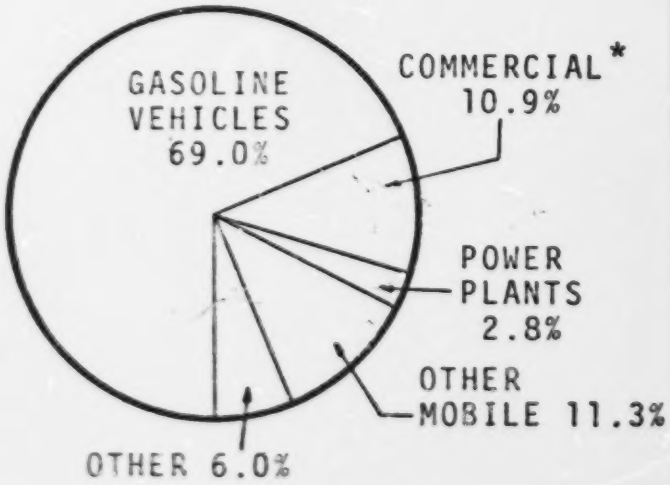
CARBON MONOXIDE



HYDROCARBON

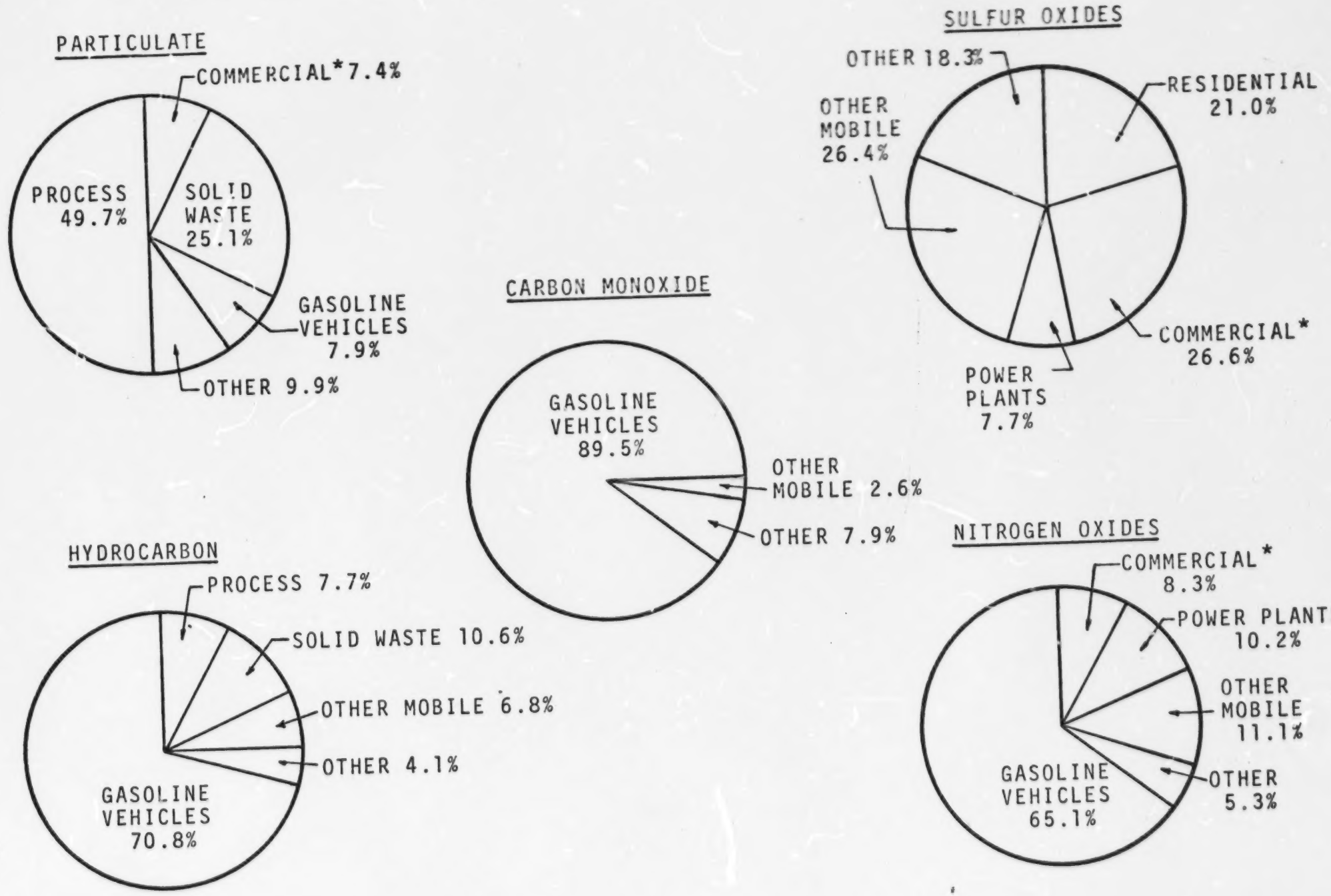


NITROGEN OXIDES



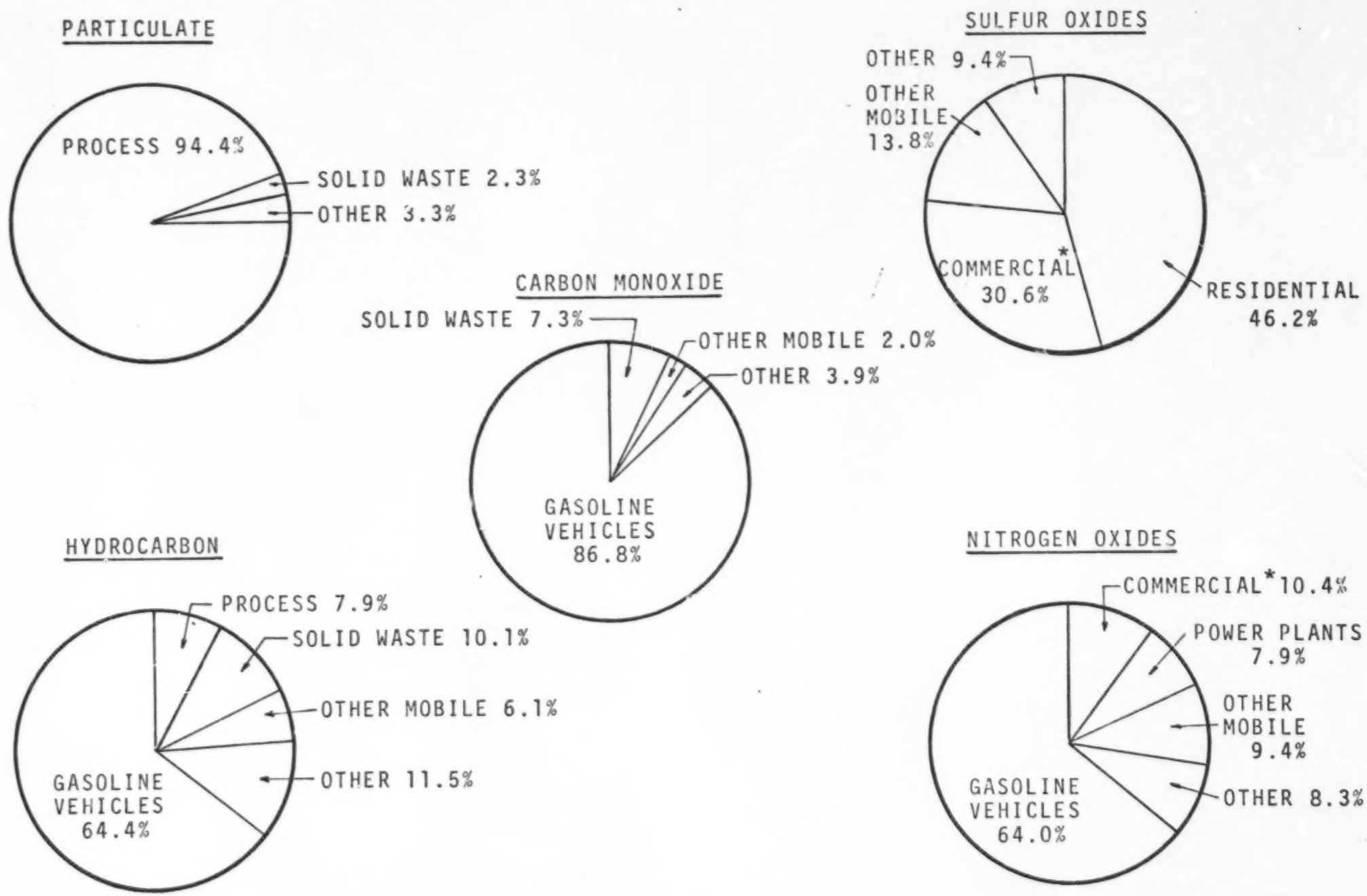
*INCLUDES INSTITUTIONAL & INDUSTRIAL FUEL

FIGURE 5.3 POLLUTANTS EMITTED BY PRINCIPAL SOURCES - NORTH CENTRAL KANSAS INTRASTATE AIR QUALITY CONTROL REGION



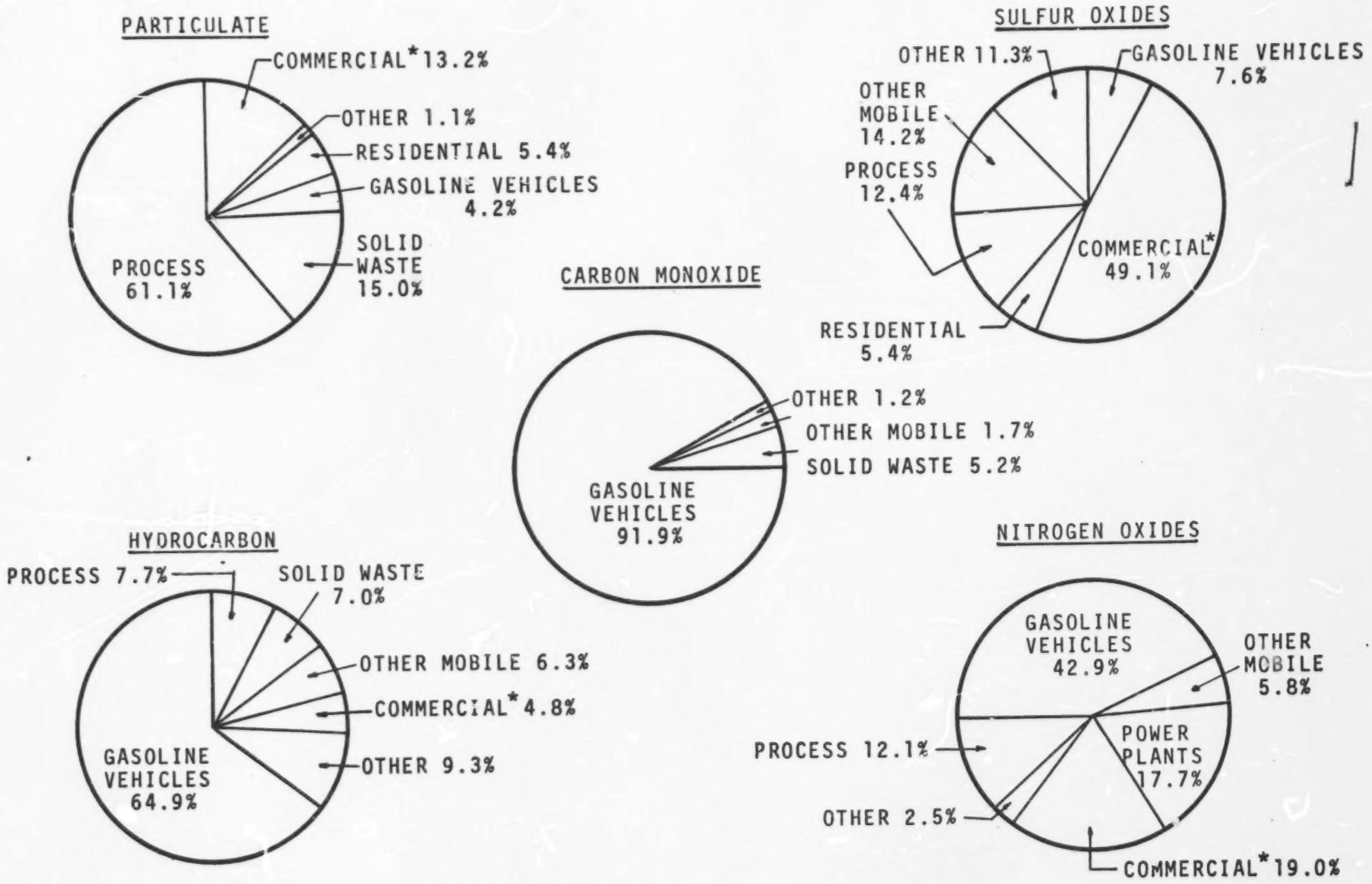
*INCLUDES INSTITUTIONAL & INDUSTRIAL FUEL

FIGURE 5.4 POLLUTANTS EMITTED BY PRINCIPAL SOURCES - NORTHWEST KANSAS INTRASTATE AIR QUALITY CONTROL REGION



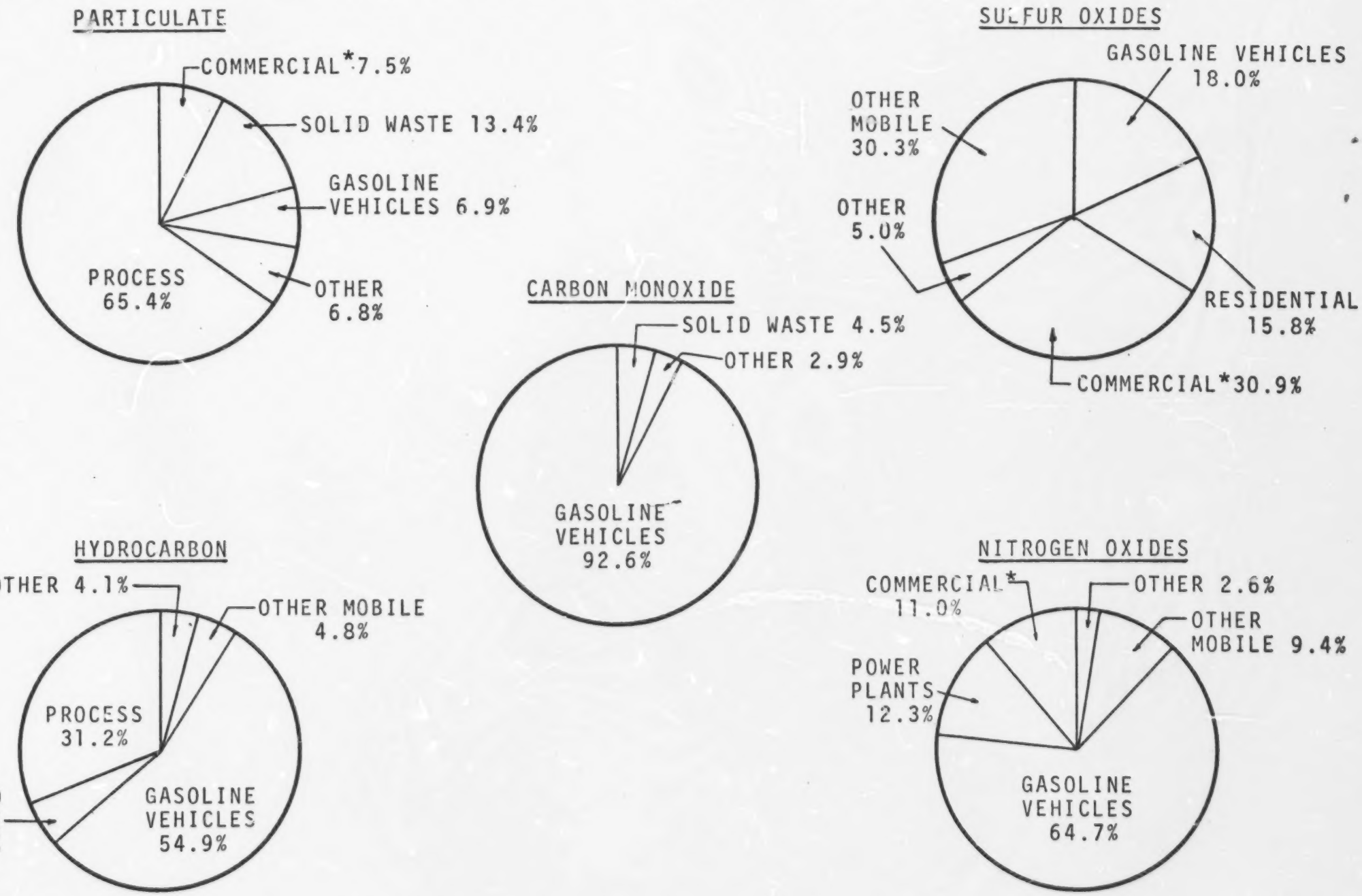
*INCLUDES INSTITUTIONAL & INDUSTRIAL FUEL

FIGURE 5.5 POLLUTANTS EMITTED BY PRINCIPAL SOURCES - SOUTHEAST KANSAS INTRASTATE AIR QUALITY CONTROL REGION



*INCLUDES INSTITUTIONAL & INDUSTRIAL FUEL

FIGURE 5.6 POLLUTANTS EMITTED BY PRINCIPAL SOURCES - SOUTH CENTRAL KANSAS INTRASTATE AIR QUALITY CONTROL REGION



*INCLUDES INSTITUTIONAL & INDUSTRIAL FUEL

FIGURE 5.7 POLLUTANTS EMITTED BY PRINCIPAL SOURCES - SOUTHWEST KANSAS INTRASTATE AIR QUALITY CONTROL REGION